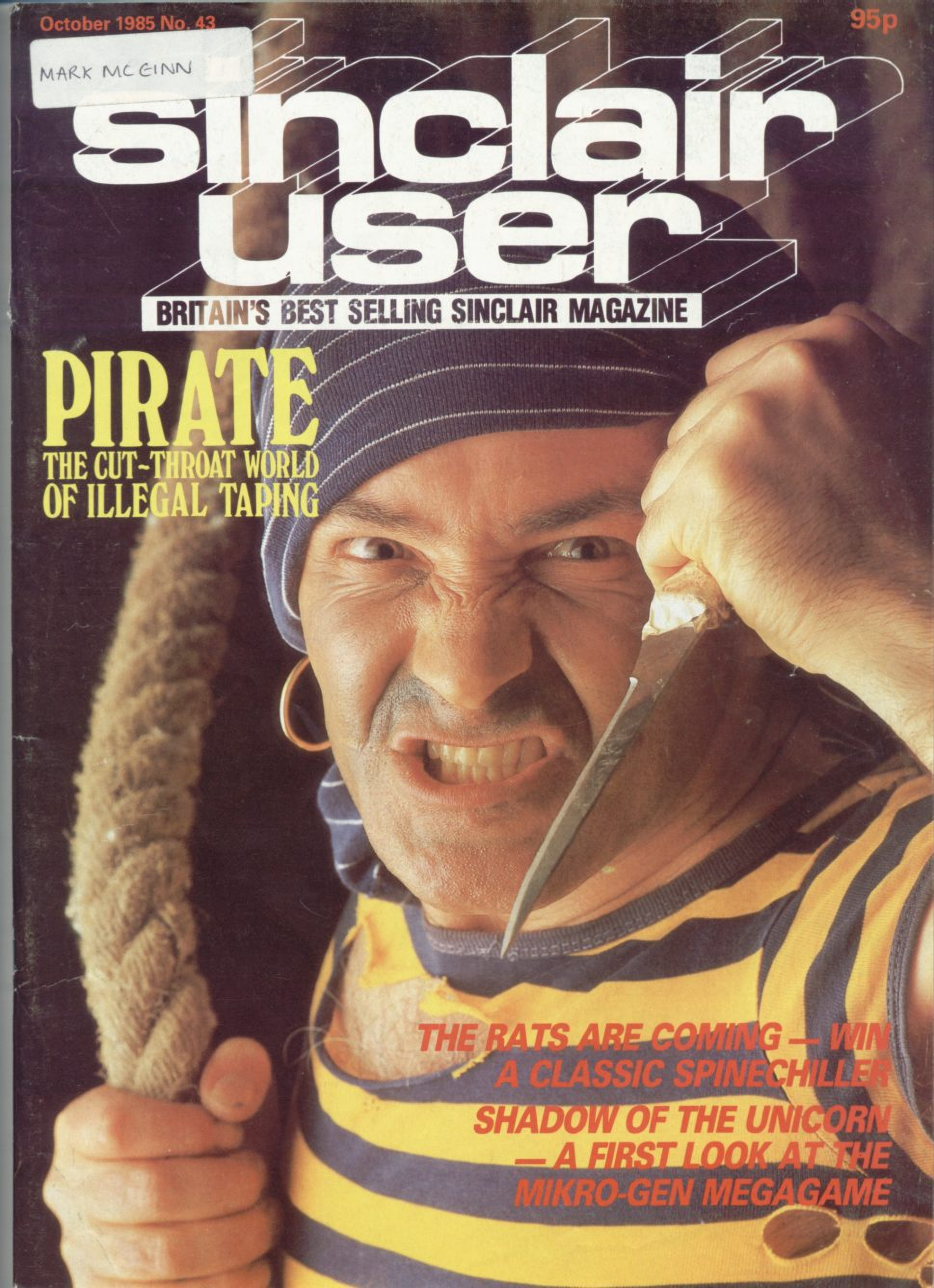
October 1985 No. 43

95p

MARK MCGINN

sinclair user

BRITAIN'S BEST SELLING SINCLAIR MAGAZINE



PIRATE

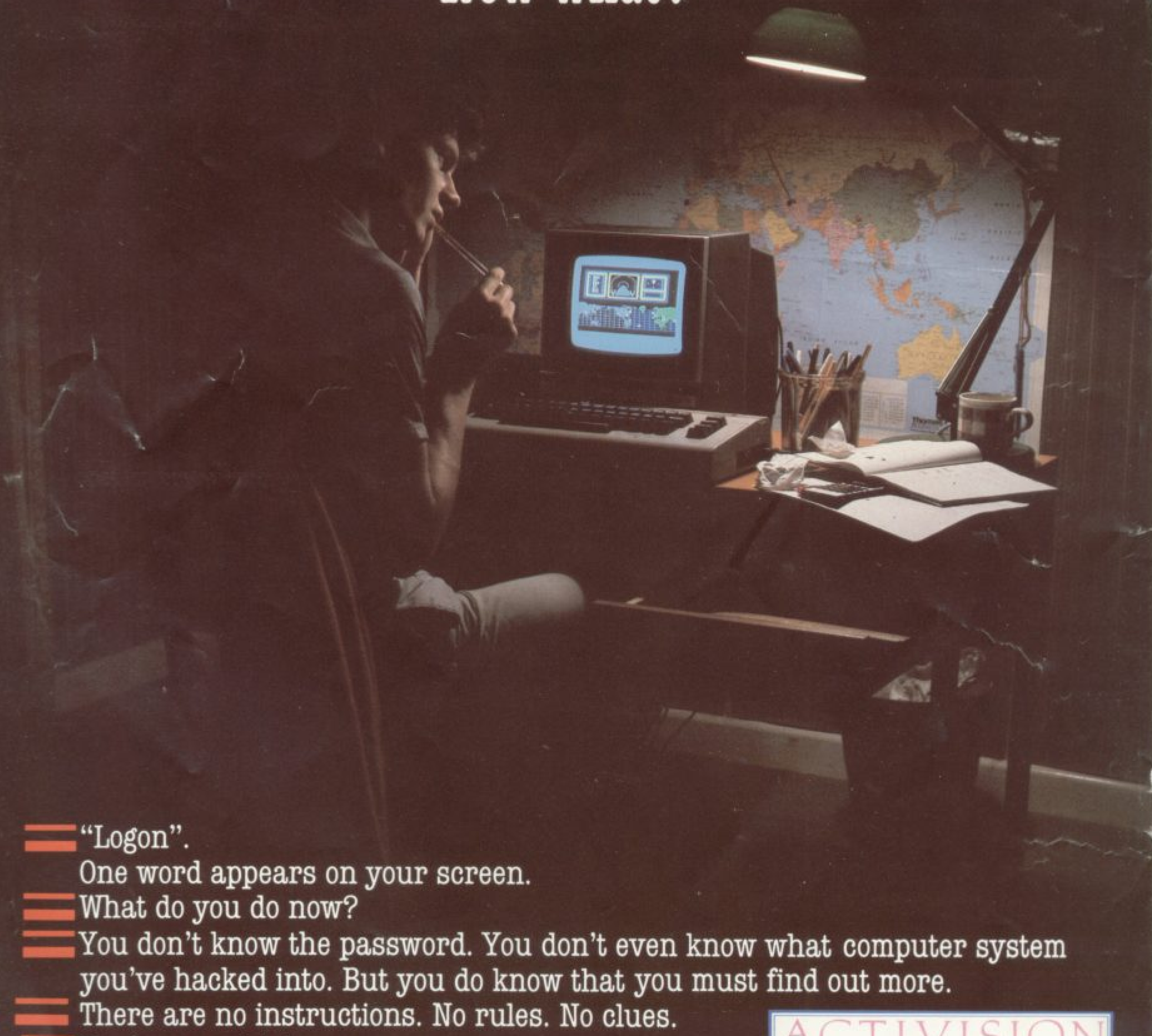
THE CUT-THROAT WORLD OF ILLEGAL TAPING

THE RATS ARE COMING — WIN A CLASSIC SPINECHILLER

SHADOW OF THE UNICORN — A FIRST LOOK AT THE MIKRO-GEN MEGAGAME

HACKER

You've stumbled into an unknown computer system. Now what?



"Logon".
One word appears on your screen.
What do you do now?
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There are no instructions. No rules. No clues.
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You've found your way in. But is there a way out?

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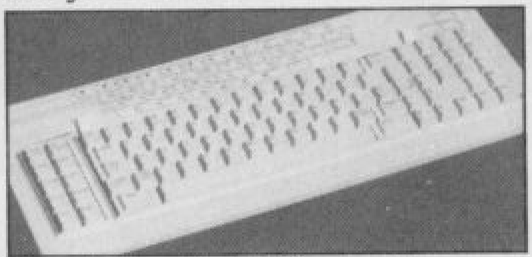
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HARDWARE

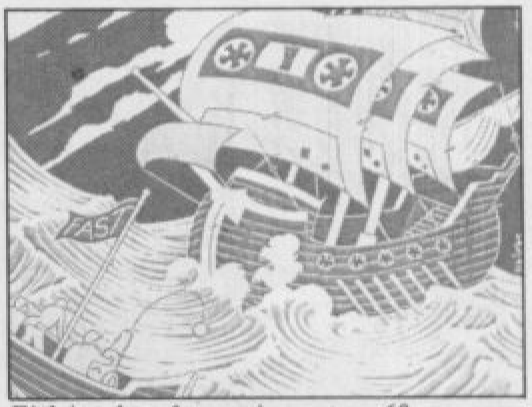

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PROGRAMMING

LISTINGS


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Fighting the software pirates, page 60

REGULARS

If you would like to contribute to *Sinclair User* please send programs or articles to:
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Original programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.
We pay £20 for each program printed and £50 for star programs.

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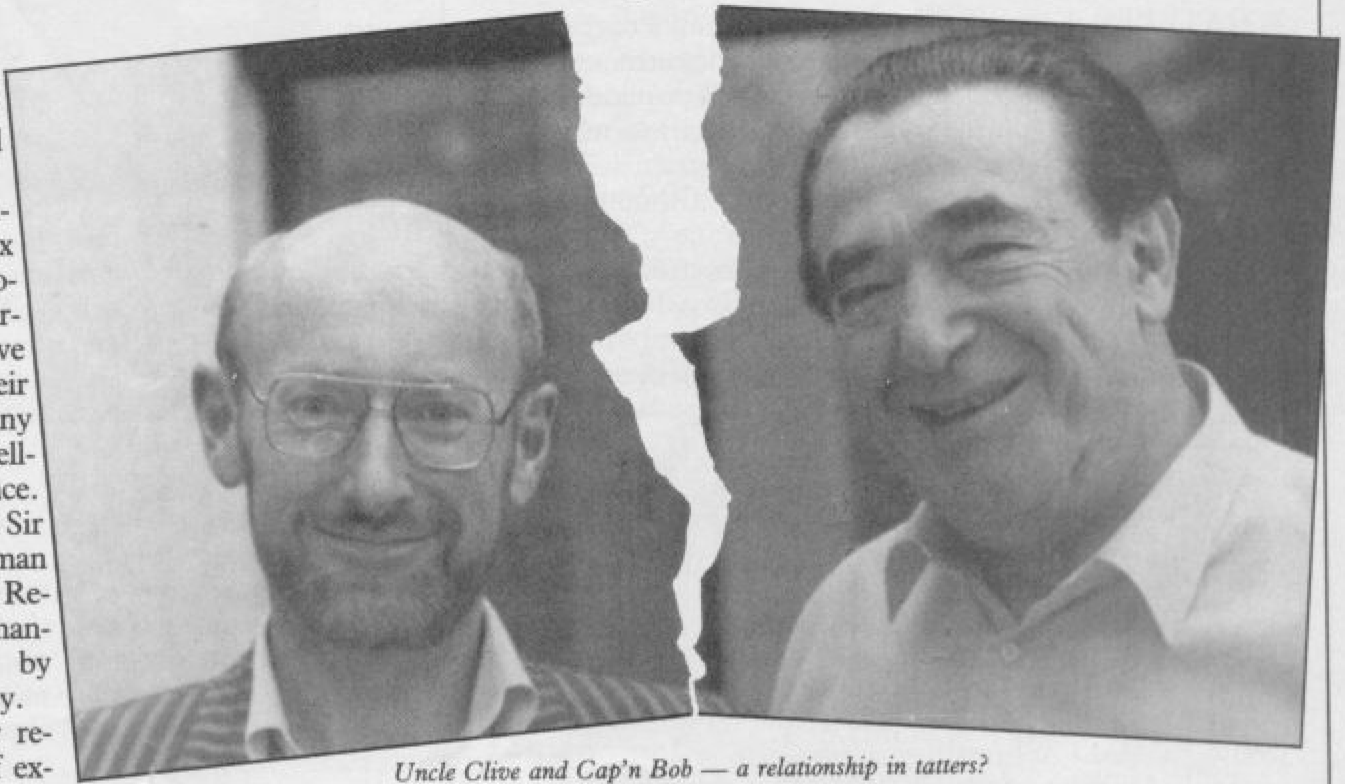
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Sinclair saved by creditors


Uncle Clive and Cap'n Bob — a relationship in tatters?

SINCLAIR Research has been saved by its creditors and bankers, after Robert Maxwell decided to withdraw his support.

The creditors, including Thorn EMI, Timex and AB Electronics, together with bankers Barclays and Citibank, have decided to extend their loans so that the company can face the Christmas selling period with confidence. The agreement allows Sir Clive to remain as chairman and director of Sinclair Research with the new management team, headed by chief executive Bill Jeffrey.

Jeffrey, who was only recently appointed as chief executive, says: "Sinclair Research now has the support of its bankers and major suppliers and we look forward to building on the company's strong market leadership position, and continuing its outstanding achievement as a source of new ideas and products."

The banks with which Sir Clive is connected are also pleased that they have been able to bail out the company. Paul Borret, a divisional general manager of Barclays Bank and one of the signatories of the agreement, says: "We are delighted that we have been able to reach an agreement on continuing financial and manufacturing support for Sinclair Research. This agreement and the new management team, combined with Sir Clive's undoubted flair in the field of research and technology, enable us to share the company's hopes for a return to sound and profitable trading."

A week before the announcement Robert Maxwell withdrew from a plan to save Sinclair Research. The reason given was that the board of Maxwell's subsidiary company Hollis, having taken advice from their bankers and a specially commissioned report, decided that the rescue would not be advisable.

The collapse of the deal was hurriedly followed by a statement from Sir Clive claiming that not only did he not need Maxwell's money but that his company was on the road to recovery, and that the Dixons deal made all the difference.

One of the main reasons for Sinclair's financial problems is the unpredictability of the home computer market. According to stock brokers Wood Mackenzie the market should be worth £430 million this year. Although Sinclair Research is likely to have a turnover of £100 million the company could make a loss of £5 million. As Sinclair Research has 40 per cent of the market share and the state of the company is shaky the situation does not bode well for the rest of the market.

Dixons gives kiss of life

DIXONS HAS made a deal with Sinclair Research which could head off some of the company's problems.

The deal, worth £10 million, means that Dixons has taken 160,000 Spectrum Plus computers and televisions.

They will go on sale in its 800 stores which include Currys outlets. Dixons are packaging the Spectrum Plus, cassette recorder, joystick and a ten-pack of Sinclair brand software for £139.99. A package which incorporates the computer, pocket television and five software titles is being sold at £199.99.

Sir Clive sees the deal as a turning point for Sinclair Research. "The deal with Dixons shows the light at the end of the tunnel. At this time I have no idea why Bob Maxwell pulled out, he may have other fish to fry. I don't think that we need anyone to rescue us.

Hunt for 128K goes on

THE 128K Spectrum does exist but might not be available until well into 1986.

Despite attempts by Sinclair Research to play down rumours of the machine, whose existence was revealed in the July issue of *Sinclair User*, it is said to have a 128K RAM which is switched in 64K chunks, two display modes, a joystick port and a sound chip which is similar to that used on the Amstrad computers.

The 128K could cost as little as £199.00 and that might be one reason why Sinclair will not yet release the machine — it would compete with the QL which is a 16-bit machine and already has 128K RAM as standard.

If Sinclair does not launch the 128K computer before Christmas it will be the only company without such a machine on the market at the end of the year. Atari, Commodore and Amstrad all have computers with 128K RAM.

more news on page 6



BT's express

WHATEVER happened to Program Express?

In July 1984 the company launched a revolutionary method of electronic software distribution. Retailers were to buy a terminal, linked to a central database, on which was stored thousands of software titles. Those titles could be downloaded onto tape or disc by the retailer and sold to the customer.

We were told that the system would do away with the usual retail problems such as choosing which titles to put on the shelves and overstocking. We were also informed that the device would be tested in branches of John Menzies and that Boots was also interested.

A year later nothing has happened — well, almost nothing. British Telecom has just become the major shareholder in Program Express. The agreement means that BT will provide finance for the operation while the three Program Express directors, Gilmour Kennedy, Bruce Nevil and Grant Robertson will share responsibility for the running of the company.

It is still not clear, however, what Program Express intends to do with its wonder network. No terminals have reached retailers and none of the promised testing has been done. A spokesman for BT says: "We are still considering the situation and our plans will be announced later."

Voyage round my modem

THE ROUND Britain Yacht Race has become available to users of Micronet 800, the telesoftware database, in the form of a multi-user game similar to **MUD** and **Starnet**.

It will cater for thousands of simultaneous players each week and employs the latest overlay frame technology to create a giant map of the United Kingdom.

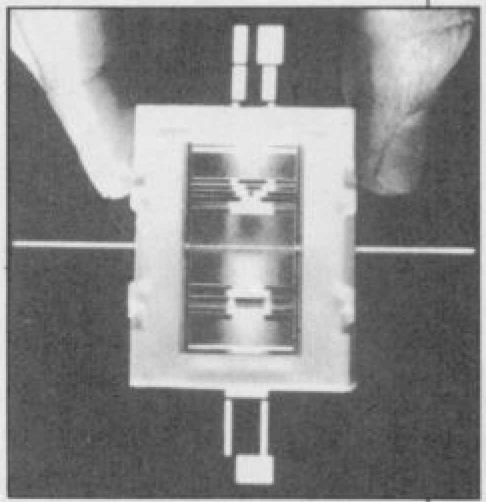
Players travel around the UK, searching for four secret locations. Clues are put onto the screen as the race progresses. Once the locations have been found they can be put into the Micronet mailbox. Winners of the race will be notified every fortnight and receive £100.

Ian Rock, marketing manager of Micronet, says that the game "represents an exciting new direction in computer games and offers significant advantages over cassette based games.

"The interactivity of Micronet allows players to confer and discuss strategies, and the game's scenario changes every week adding a high degree of flexibility."



Children of the Lens



LENSLOK is a new security device which protects software from piracy while allowing back up copies to be produced.

It is a two-part system. The first part is a machine code routine which produces a code on screen which must be typed in before the software can be used. The second part is a lens which arrives with the program.

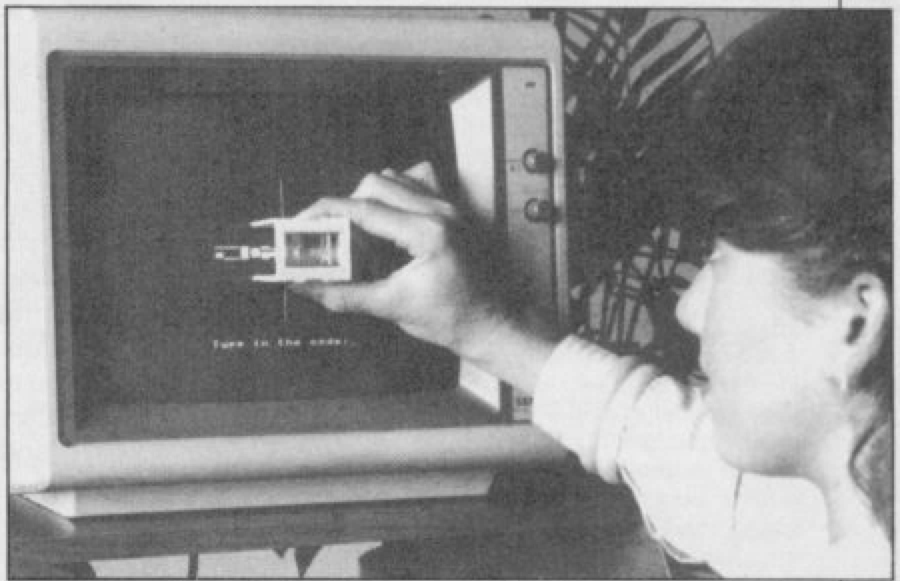
When a lenslocked code appears on the screen, it can only be read by placing the appropriate lens above it and looking through the lens. Each code contains at least two characters — upper and lower case letters or numbers. Each time the game is loaded the code will be different, but it can read in the same way.

Each lenslocked product will arrive complete with its own lens. It cannot be used with another game, even with one produced by the same company.

The first game to feature the new system will be the Spectrum version of **Elite** from Firebird. ASAP Developments, the manufacturers of Lenslok, expect to see a large number of other games including the system on the Christmas market.

Unlike previous protective dongles, the Lenslok is cheap to manufacture and not unnecessarily bulky. Manufacturers can protect themselves against piracy without incurring high costs, which would be passed on to the purchaser.

The only way for pirates to break into the system appears to be the coding system buried in the software. ASAP admits that, like any protection device, it is not 100 per cent secure, but stresses that even the most experienced hackers will have problems breaking this system.



The major problem for users seems to be the possibility of losing or damaging a lens. Back-up copies of software will prove useless if the appropriate lens is not available.

In the long run, it is the user who stands to gain from the elimination of piracy. Software theft costs manufacturers money, and the only way they can recoup that money is in the price of games. If the Lenslok code prove secure it could benefit all software users.

Stonechip goes bust

STONECHIP Electronics has gone into liquidation. The company was one of the first to manufacture an independent 16K RAM pack for the Spectrum. Since then it has been producing upgrades for the Spectrum, joystick interfaces and keyboard.

Bud Computers has also gone into liquidation. The company produced the Interstate 31 and Interstate-Pro joystick interfaces.

Jolly Roger in the dock

PIRACY does not pay and CP Software can prove it.

The company has successfully brought a prosecution against market trader Andre Bitton for selling counterfeit computer software. The case was tried before magistrates at Guildford, Surrey, where Bitton pleaded not guilty to 16 charges brought against him. Despite the plea the magistrates found him guilty of all charges and imposed one fine of £30 for a Copyright Act offence and 15 fines of £100 on offences under the Trades Descriptions Act.

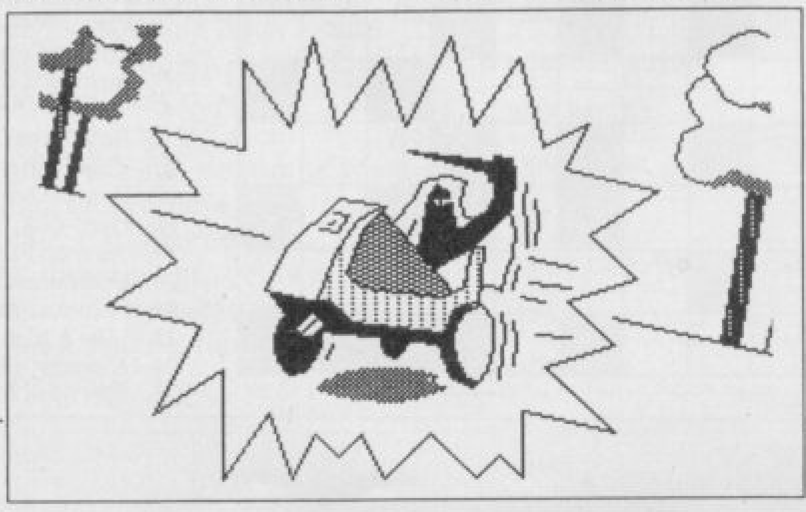
Chris Whittington of CP Software says: "We think that the case will make people in the industry sit up and take notice.

"As you can see the fines are pretty hefty and this guy has had his fingers burned."

Getting bored of the rings at last

BORED OF THE RINGS, awarded a *Sinclair User* classic in July, is now to be marketed by Silversoft.

The game is a cheerful spoof of Tolkien's trilogy, put together with the help of Gilsoft's **Quill** and **Illustrator** programs, and written by software house Delta 4. It stars Fordo the Boggit who lives in the Shire with his uncle Bimbo. His great quest brings him into contact with such dubious characters as Legoland the Elf and Giblet the Dwarf.



Silversoft was first involved when a distributor which wished to sell the game contacted its sister company, CRL. With a heavy load of new releases on their plate, CRL suggested that Silversoft take on the game, which was previously available by mail order only.

The game has been extended slightly for Silversoft. It contains more pictures and locations in a longer version of the adventure. Look out for it in the shops.

more news on page 8

Winners do it in style

THE WINNERS of the Saga graphics utility competition in the August issue of *Sinclair User* are: Roger Bateman of Bracknell, Berkshire; David Pegg, Cheshunt, Hertfordshire; N Fear, Westbury-sub-Mendip, Somerset; and A Richards, Sheerness, Kent. All four will receive a Saga graphics tablet and Style interface.

The 10 runners-up, who each win Style on its own, are: K H D Bailey, Hastings, Sussex; M J Sharp, Thurlaston, Leicester; Phil Morse, Welwyn Garden City, Hertfordshire; Peter Stokes, Trowbridge, Wiltshire; L Boulton, Bradford; A T Fowler, West Ewell, Surrey; Jonathan Walters, Bangor, County Down, Northern Ireland; D S Sims, Plymton, Plymouth; R J Bending, Farnborough, Hampshire; J Skinner, Peckham, London SE15.

All winners correctly indentified the alien message as 'Do it in Style' and its planet of origin as Venus.

All entrants will receive a £2.00 voucher redeemable on Style, and a £5.00 voucher redeemable on the graphics tablet, if bought direct from Saga Systems.

Going back to schools

AN INITIATIVE aimed at reviving the ailing educational software market has been launched by eight software companies.

The British Educational Software Associates, or BESA, are looking to establish an initial network of 200 retail outlets – specialist dealers who will stock a core of 40 educational titles and offer customers advice.

The emphasis is on service, with a catalogue of some 250 programs and an ordering system available to parents and teachers. "Educational software is not an impulse purchase," says Roy Davey, marketing director of Hill MacGibbon and Collins. "Customers want to know where they can find a good stock and see it demonstrated."

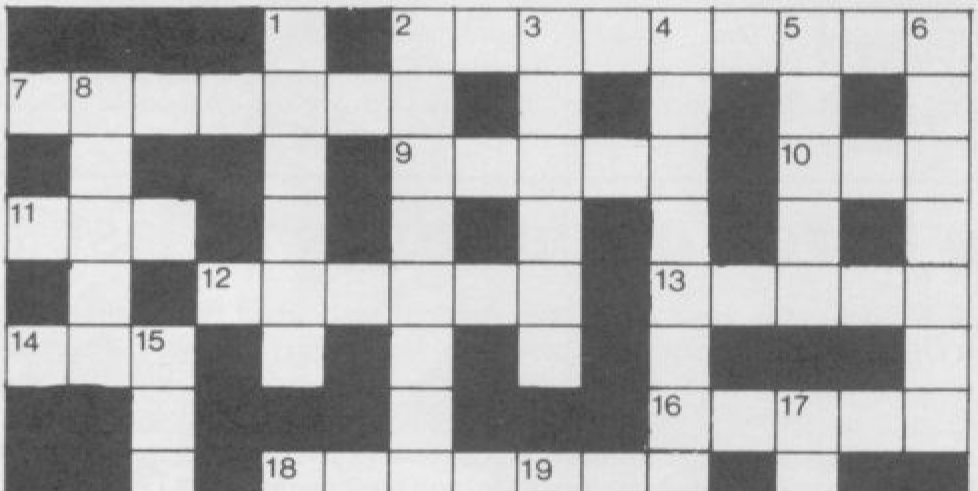
Martin Neild of MacMillan says the market has grown since the days when the home computer was expected to revolutionise learning overnight. "Software publishers have learned from their mistakes and are now publishing top quality imaginative software. Now it's a question of regaining the confidence of the retailer and the end-user.

There are hopes of expanding the Association's activities next year. The founding companies – ASK, Calpac, Collins, Bourne Educational, Widgit, Hill MacGibbon, Griffin and MacMillan – hope to be joined by more producers next year.

Further information is available from Barbara Warren of Calpac, on 048-67 2584, or Martin Neild of MacMillan on 01-836 6633.



ZXWORD by Henry Howarth



solution on page 124

Across

2. The driving force behind the C5 (9)
7. Headroom fit to buy up Sinclair Research? (7)
9. A poem with an electric attraction, in a negative sort of way (5)
10. Equality in Part (3)
11. Origins of direct data entry (3)
12. Metal associated with cadmium in 2 across (6)
13. Complete sum (5)
14. Partly amended the Basic statement (3)
16. Writer in the operating system prepares file for access (5)
18. Hex EF OR Hex 10? (7)
20. Spectrum assembled UAMGT (5)
23. Trig ratio of some standing (3)
25. Dappled microcomputer (5)
27. Dieter changed to change again (2-4)
28. Truncated Basic statement? (3)
29. Joint found in the chips (3)
30. Computer aided management or alternative set of instructions (5)
31. Variable holding memory address — it's a dog! (7)
32. Tragic! — red ruined the little storage device (9)

Down

1. Erasable manual data recorder! (6)
2. Pandora's melanic data recorder? (5-3)
3. Fishes for adventure game heavies (6)
4. Choose Reagan, perhaps, to name Acorn product (8)
5. Introduce run, it appears (5)
6. Screens up the Dead Sea documents (7)
8. An odd peripheral? (3-2)
15. This Plotter gets some stick! (4)
17. Routine way out! (4)
18. Hard-disk tape unit with a shocking cold (8)
19. Surround note with carrier wave (8)
20. Diagrammatic sort of chip rag (7)
21. Carted around and checked at run time (6)
22. Like a high-tech limb in embryonic form (6)
24. A quaint angle? (5)
26. Spectrum keyword from Fleet Street (5)

New releases

THE BLOODY war veteran *Rambo* is set to explode onto your computer in October in **Rambo's Blood Part II,** from Ocean, costing £7.95.

Also in October, Ocean is releasing **Transformer,** based on the latest toy craze of robots. It will cost £7.95. **Cosmic War Toads** is the working title for the next Ocean game.

Lothlorien has just released **Arena,** an arcade game with futuristic tank battles priced at £9.99, while Mind Games is releasing **Evil Crown,** set in feudal times. It is icon driven and costs £7.99.

Schizofrenia is about to escape from Quicksilva. As Alfonse, cleaner at a laboratory, you must regain your alter ego. Price £7.99.

As threatened, Global Software is publishing a series of Golden Turkey Games. **Attack of the Mushroom People** is out in October. The games will cost £6.95.

Fun 'n' Games is the new label from New Generation. **Custard Kid** is set in a custard pie factory. **Cliff Hanger** relies heavily on the humour found in cartoons such as *Road Runner*. Both games cost £4.95 each.

A new game from Melbourne House is set in Egypt. **Fighting Warrior** is the working title, the price £6.95, and it should be out at the end of September.

Activision enters the ring with **Barry McGuigan's World Championship Boxing.** Price and release date still being considered. Imagine that you have entered a major business computer. That is the start of **Hacker,** from Activision. The game is scheduled for September.

Be the scourge of the high seas. **Seas of Blood** is on the Fighting Fantasy label and costs £9.95.

International Karate, by System 3, is due out soon and costs £6.50. **Revenge of The Last Ninja,** will be released in October.

Gilbert Gumphrey is the store detective known as **Grumpy Gumphrey.** The game by Gremlin Graphics, comes out in November, priced at £7.95.

Saving the people of New York from evil is the plot of **Superman,** from Beyond, due out in October at £9.95.

Electric Dreams Software has two games due out. **Riddlers Den,** a strategy/arcade program, priced at £7.95, and **I of the Mask** based around a masked robot character. Price is set at £9.95.

Orpheus is releasing **The Young Ones** in October, based on the unpleasant TV comedy series. It is icon driven and will cost £7.95.

Chartwatch

LAST MONTH we bemoaned the absence of **Frank Bruno's Boxing** from the charts. Now it's gone straight to number one with a bullet, while **Rocco's** on a downward spiral and Alligata's abysmal **Knockout** is out for the count.

Other new entries include Mirrorsoft's excellent **Dynamite Dan**, the classic **Frankie**, Vortex's **Highway Encounter** and Level 9's **Red Moon. Pole Position, Dam Busters, Nick Faldo's Open, Nonterraqueous, BMX Racers** and **Monopoly** are also new to the hit list.

Some lunatics out there are still buying Mastertronic's **Action Biker**, and **Daley Thompson's Decathlon**, over a year old, continues to sell well.

There's still no sign of the **Fourth Protocol**, and Melbourne's **Way of the Exploding Fist** has yet to make the same devastating impact that it had on the Commodore charts.

GALLUP TOP 30

This chart is compiled by Gallup by sampling sales at 250 retail outlets, including high street chain stores and independent home computer shops

MONTH ENDING AUGUST 23

1	FRANK BRUNO'S BOXING	ELITE
2	HYPERSPORTS	IMAGINE
3	SOFT AID	VARIOUS
4	DYNAMITE DAN	MIRRORSOFT
5	SPY VS SPY	BEYOND
6	JET SET WILLY 2	SOFTWARE PROJECTS
7	ACTION BIKER	MASTERTRONIC
8	SPY HUNTER	US GOLD
9	ROCCO	GREMLIN GRAPHICS
10	NODES OF YESOD	ODIN
11	FRANKIE GOES TO HOLLYWOOD	OCEAN
12	CAULDRON	PALACE
13	POLE POSITION	US GOLD
14	BRUCE LEE	US GOLD
15	DUN DARACH	GARGOYLE
16	GLASS	QUICKSILVA
17	HIGHWAY ENCOUNTER	VORTEX
18	WORLD SERIES BASEBALL	IMAGINE
19	DAM BUSTERS	US GOLD
20	EMPIRE FIGHTS BACK	MASTERTRONIC
21	A VIEW TO KILL	DOMARK
22	NICK FALDO'S OPEN	ARGUS
23	TAPPER	US GOLD
24	NONTERRAQUEOUS	MASTERTRONIC
25	BMX RACERS	MASTERTRONIC
26	SHADOWFIRE	BEYOND
27	RED MOON	LEVEL 9
28	DALEY THOMPSON'S DECATHLON	OCEAN
29	FINDERS KEEPERS	MASTERTRONIC
30	MONOPOLY	LEISURE GENIUS

QL prices plummet



THE PRICE of the QL has been slashed in half, making it the only 16-bit microcomputer for less than £200.00.

The move comes at the start of what Sinclair Research claims to be an agressive Christmas marketing compaign and should make potential customers think twice before buying machines such as the ST and Amiga.

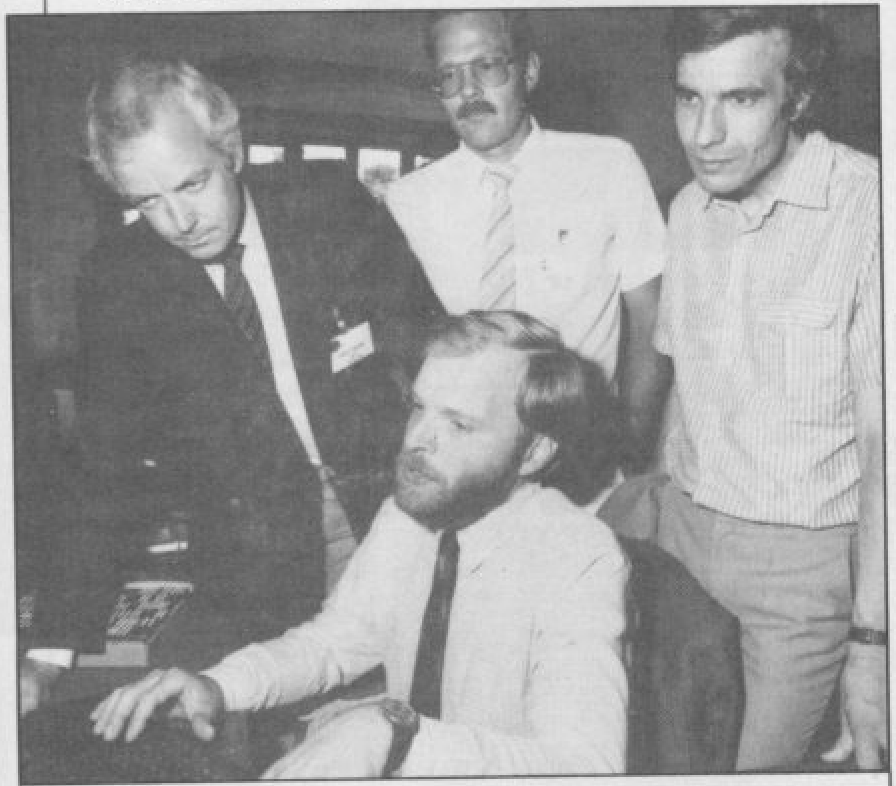
Jane Boothroyd, UK sales and marketing manager for Sinclair Research says: "We have reduced the price of the QL to consumers in line with reduced manufacturing costs. We will achieve major savings from a substantial increase in manufacturing volume. If the QL price drop is successful in attracting new customers it will bring down the price of software and should entice more software houses into the QL market."

Veronica Colin, of Talent Software, sums up the mood of software houses. "We anticipated that the QL would come down in price and the market should expand. Software prices have not gone down, even with the drop in price of microdrive cartridges, because duplication costs increased by 20 per cent.

"The drop in price of the QL should do us good but hardware companies may have problems as some peripherals now cost more than the QL."

Hardware companies, however, are not too pessimistic. A spokesman for CST, manufacturers of disc drives and interfaces, says: "Anything which boosts the sales of the QL should be seen as a good thing. I would defend the prices of our products as they are selling at the market price.

"The only thing which we are worried about is the effect of the price drop on the QL. It could push the QL down market into the range of the Spectrum Plus. Games manufacturers would have a good time but it would take a while before the children have their fill of it and parents think about serious uses which would require our products."



DELEGATES from the International Banking Summer School look on as Chris Clifton tries to demonstrate a Home Banking Facility on the QL. The facility, tied into the Nottingham Building Society, will allow you to move money from one account to another, check standing orders, order cheque books and pay bills.

Lattice C now available

A FULL implementation of Lattice C — the Kerninghan and Richie C standard — is available from Metacomco.

It is the first full version of the medium level system development language for the QL and, at £99.95, it is one of the most inexpensive for any computer.

The package includes a detailed user manaul, three microdrive cartridges and a ROM which contains part of the operating system and also ensures that the package is virtually pirate proof.

The language will compile to true 68000 code and is compatible with Lattice compilers on the IBM PC. It has a library of Unix, QDOS and utility functions.

The only product to which it could be compared is Prospero C, from Computaware. That company promises a full Kerninghan and Richie implementation but it will not be available until later this year and a price has not been fixed.

Accountancy packages

THE HOME Accounts Manager is the most competitively priced package in a new accounting program range from Dialog Software.

The first part of the package includes a budget routine into which all day-to-day expenses and standing orders set for banks, buildings societies or other organisations can be placed. The bank account part of the program deals with all cheque transactions and cash dispensers and produces a bank balance.

Transact is the first full book-keeping system for the QL. It can deal with nominal ledger transactions, VAT payments, and profit and loss figures.

The Dialog **Sales Ledger and Invoice Processor** provides an open item accounting system. It can be used to create invoices from your product tables, take a stock of your products and implement trade discounts on certain lines.

The **Transact** book-keeping system and **Sales Ledger** are priced at £34.95 each while **Home Accounts Manager** costs £19.95. More information about the range of products can be obtained on 01-502 4328.

QL plus disc?

A NEW VERSION of the QL may be on the way, according to sources close to Sinclair Research.

The machine, based on QL technology, is likely to have ½ megabyte of RAM, and may offer one inbuilt disc drive instead of the two microdrives. Full versions of the four Psion exchange packages may also be available in ROM on board the computer.

As yet there is no hint of a possible price, but if the machine is launched, the recent QL price cut leaves an obviously attractive niche at the £400 level.

Horror over red propaganda



Thatcher – unrepentent

THANK YOU for your perversion of the innocent game **Shopkeeper** in your August issue.

It is quite obvious that you are anti-Conservative and anti all other good things. I refer to the picture on pages 78 and 79 of a Mrs Snatcher — looking uncannily like our Maggie — snatching an old lady's cash. It is despicable and disturbing anti-Conservative propaganda.

What will we see next? How about games supporting the Labour party — **Dustman Kinnock,** or what about **Uprise and Overthrow the Government and join the Labour party?**

What worries me is that impressionable young people are subjected to this drossy propaganda and are thus influenced by your advertisements for the left. Where will it all lead? Perhaps to the greatness of Communism and the myth that all are equal — ho hum!

Anthony Smith, Hoddesdon, Hertfordshire

PS. I don't expect to see this letter published as freedom of speech is not allowed in Communist magazines.

● *Wrong again, you capitalist running dog! Long live the revolution! You'll be first against the wall when (that's enough. Ed).*

Piracy – the growing trend?

YOUR NEWS story — Spanish Connection, August — attracted my attention.

I don't pretend to defend piracy and by no means support companies like Inforpress, who know they are in a market which can't stand the large numbers of imported games at standard prices.

However, while games like **Underwurlde** and **Knight Lore** cost 3,000 pesetas, who can resist the temptation of buying a program from a friend at only 150 pesetas?

I am aware of the danger piracy represents to the software industry, but I think software houses should consider the possibility of reducing their prices — and not just complaining.

Fernando Cortés Cabanillas, Madrid, Spain

Mesmerised by a load of . . .

THERE ARE plenty of rubbishy rip-offs on the market and your magazine's to blame, encouraging garbage as you do with reviews of games you say are good, but which I think are awful.

One such game is **Shadowfire,** which Clare gave classic status — I can only think Clare was mesmerised by the pretty graphics! For a start, if a group of **Shadowfire** characters are attacked, they stand like dummies, with their life-blood seeping away until you instruct them to defend themselves.

The game also supplies a bewildering array of weapons, but doesn't tell us which are the most powerful and whether they have an adjacent location range.

Mick Godwin, Leicester

● *You weren't mesmerised, were you, Clare? Clare? Clare! C'mon, wake up. Snap out of it.*

Mixing politics and computers

I HAVE just read an article by M J King in Letters — August issue — and I am glad the Ed sorted him out.

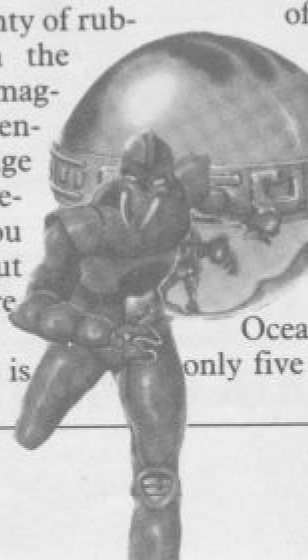
However, in this day and age, people are supposed to be allowed to express themselves freely. And if others don't like it, then that's tough.

So my final advice to Michael King is to vote for the *Sinclair User* Party — and leave politics to the politicians.

M Sellars, BFPO 16

● *The* Sinclair User *party. Now there's an idea . . .*

No music to relax to



IN YOUR REVIEW of **Frankie Goes to Hollywood** — July — you state that there is a 15 minute live version of *Relax* on one side of a separate tape, and on the other side, playing tips by Patrick Allen.

I have bought the game and that is not true — Ocean says there is only five minutes of *Relax* on each side. I was very disappointed when I received the game.

N Couley, Nr Ormskirk, Lancashire

● *The version we reviewed was, as stated, pre-release, and Ocean assured us at the time that a live* Relax *would be included. Slapped wrists all round. Still, the game's not bad, is it?*

Disgust over Manx review

I WAS amazed when I read Mike Wright's review of Manx Tapes' **Classic Book-keeping System** — August.

As a purchaser of the system I must point out some of the inaccuracies and inadequacies of the review.

The most obvious inaccuracy concerns the price of the system. The reviewer states this as £69.95. On page 62 of the same issue, is an advertisement which shows the price of the larger of the two systems to be £69.00. The smaller system costs £46.00.

True, the system requires five further cartridges for storage of data. How else does the reviewer imagine that the large amounts of data which are processed are to be stored?

The system is far from complex. The user is instructed at every stage and each routine follows a logical path.

If you do not have the time or a sufficient understanding of accounting to enable you to carry out a proper review of such programs, then it would be fairer, not only to the authors but also to your readers, if you declined to perform the task at all.

P M Mountjoy, Gloucester

● *Mike Wright reviewed an earlier version which has since been improved. A review of the new system appears on page 80 of this issue.*

more letters on page 14

Same old story

I AM writing to complain about the review given to **Jet Set Willy II.** Why did it receive a three star rating? It is very good value for money and has excellent graphics, sound, and an additional 42 new rooms. I would recommend this game to all Jet Setters. Apart from the reviews, I enjoy your magazine. Keep up the good work and bring back the Gilbert Factor.

David Little,
Chislehurst,
Kent

● *How much is Gilbert paying you?*

High scores on trashy games

WHEN PEOPLE claim to score millions of points on their fourth of fifth go at a game, it just shows how rubbishy and easy those games really are.

Surely, if manufacturers made harder games, the consumer would be more satisfied and more likely to buy the next game brought out by that company. Whatever happened to programs like **The Hobbit** or **Project Future** where there is a challenge each time you play the game?

Andrew Grant,
East Budleigh,
Devon

Surgery for dead micros

I RECENTLY reversed the polarity on the power supply to my Spectrum.

Referring to an article — August issue — on where to get poorly Spectrums fixed, I noted your enthusiasm for a company called Mancomp.

I arrived at Mancomp with my dead Spectrum and walked out 25 minutes later with a fully repaired and tested machine.

I can recommend Mancomp unreservedly to all Spectrum users.

Gary Woolley,
Redditch, Worcester

Anonymous programmer

I WAS glad that you published my program in your August issue, however you did not include my name. I would be grateful if you would acknowledge my writing of **Isotopes** for the 48K Spectrum.

John Pitcher,
Cults, Aberdeen

Jolly good service

TOP MARKS for Beau-Jolly! I bought their Value Pack only to find there were no instructions included and **Pedro** refused to load.

Beau-Jolly quickly replaced it with a fresh pack — checked before despatch — with the all important instructions. First class!

Ian Nelson,
Insch, Aberdeen

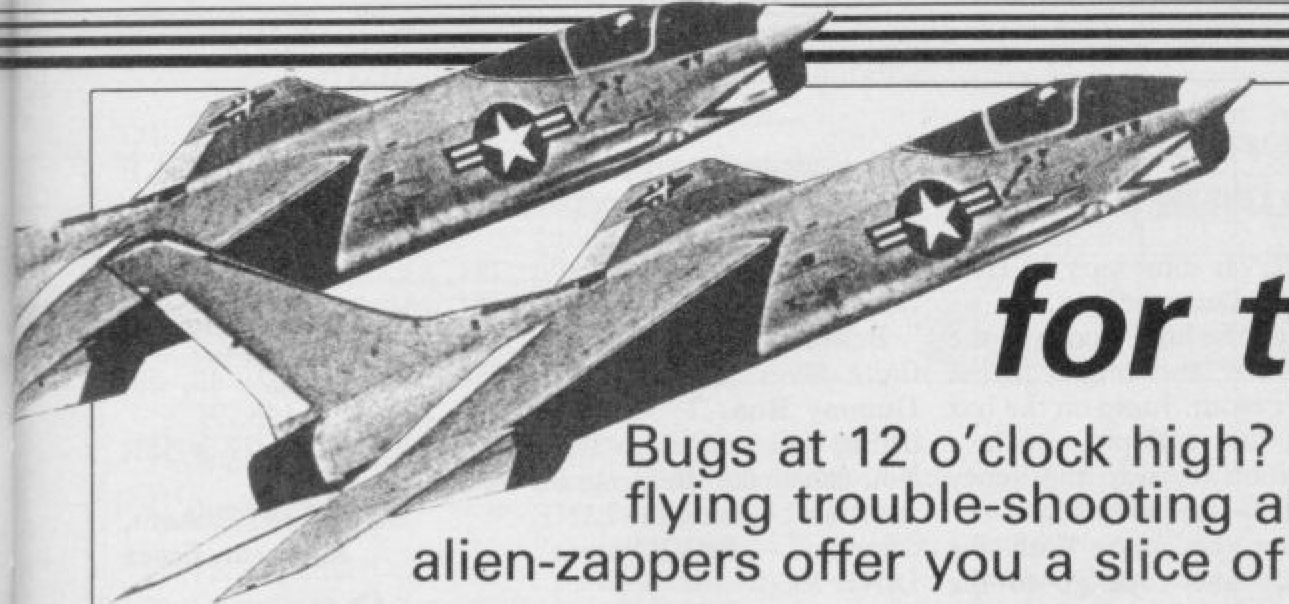
Penpals wanted

I AM 13 years old and would like to communicate with anybody who owns a Spectrum. I am interested in programming and playing games, and would be happy to swap programs, tips and POKEs.

Daniel Heuston,
63 Recreation Avenue,
Harold Wood,
Romford, Essex

I AM 10 years old and own a 48K ZX Spectrum. I am looking for a male pen friend between the ages of nine and 11 to exchange tips for games.

Ian Cook,
82 Arrendene Road,
Haverhill, Suffolk



Reach for the sky

Bugs at 12 o'clock high? Need some high-flying trouble-shooting arcade action? Ace alien-zappers offer you a slice of the right stuff . . .

Fighter Pilot

I HAVE just finished **Fighter Pilot** after shooting down 12 enemy aircraft on level Ace.

Has anyone landed the F15 with the flaps and undercarriage destroyed? If not, here is how to do it.

First of all, get your air-speed to around 130 to 140 knots, but be careful of going below 130 as you will stall without flaps. Next get your VSI to -5 or -7 with about half a mile to go, the altitude at that stage depends entirely on you — mine is around 100 to 120. Then sit back and enjoy the landing.

This must surely be a bug.

**Mark Testrow,
Allerton,
Liverpool**

Frank Bruno's Boxing

IS ANYONE having trouble reaching Peter Perfect in **Frank Bruno's Boxing**?

If you are, enter your name as BOB with an EVBA membership code of NG8INI394. I have managed to knock the champion out in 18.04 seconds, has anyone beaten this?

**Robert Dunning,
Middlesbrough,
Cleveland**

Booty

WHILE PLAYING **Booty** I fell into a bug. I was on a platform when I missed a lift, and fell to the floor. The computer then locked. My final score was 14 with 3 lives left.

**Matthew Sharples,
Great Melton,
Norfolk**

Spy Hunter

IN **Spy Hunter** from US Gold I have noticed a bug. If you follow the truck from the start, being careful not to run it off the road or shoot it, then no enemy agents' cars will appear on the screen.

**Andrew Billimore,
Inverclyde,
Scotland**

Hypersports

I HAVE just beaten Stephen France's highest score on **Hypersports** – September issue. My highest score is 226872 and my best individual scores are:

Swimming — 25.88 seconds; Skeet shoot — 9200 points; Long horse — 9.56 marks; Archery — 4000 points (wind 5); Triple jump — 17.02 metres; Weightlifting — 195 kg.

I have also finished **Alien 8** and **Knight Lore** and I beat the computer on level 5 of **Spy vs Spy**.

**Jon Goodheart,
Witham, Essex**

Highway Encounter

ON August 13, I passed Zone Zero of **Highway Encounter** from Vortex.

Block the path of your Vortons at Z29, go on, using blocks to block the paths of aliens, then go back and collect them.

**Martin Hewes,
Woking, Surrey**

Fantastic Voyage

USING THE Pokes for **Fantastic Voyage** in the August issue, the first section of the sub is in the mouth; the second — intestines; the third — liver; the fourth — gall bladder; the fifth — pancreas; the sixth — duodenum; the seventh — stomach and the eighth is in the colon.

If you are worried about the time limit — the clock restarts at 60 minutes. The escape route is through the optic nerve in the brain to the eye.

**Chris Mcgrail,
Sheffield**

Mugsy

IF YOU need more cash in **Mugsy**, type 999999999 and you will get millions of dollars. Type that in when you are asked how much you wish to spend on artillery and ammo. But be warned, type it in again and the game freezes.

**D A Scott,
Killingworth,
Newcastle-on-Tyne**

Cauldron

TO OBTAIN infinite lives in **Cauldron**, wind the tape forward to just past the title screen, and type in this program.

```
10 CLEAR 24599: FOR f = 23296 TO 23309: READ a: POKE f,a: NEXT f
20 LET L = USR 23296: POKE 40060,0: LET L = USR 24600.
30 DATA 221, 33, 24, 96, 17, 232, 159, 62, 255, 55, 205, 86, 5, 201
```

Type RUN and restart the tape.

**Steven Ashford,
Sutton Coldfield,
West Midlands**





Monty is Innocent

I HAVE got to be the only person to have completed **Monty is Innocent** in a record time of 56 seconds.

To complete it you don't have to collect a gun, just collect the bottom key on the left and enter the middle cell on the left, if Monty is there. Take him through the underground tunnels checking all the rooms, left and right, for potion.

Does anyone know how to get into the coal train in **Wanted: Monty Mole.** Also would anyone like to be my penfriend to exchange hints, tips and programs?

Tim Stollery, (13 years),
31 Musquash Way,
Hounslow, Middlesex
TW4 7PH

Herbert's Dummy Run

I HAVE some tips on **Herbert's Dummy Run.**

Get the honey pot and the box key and return to the start room. Jump on the box and that will put you in a position to swap the honey pot for the teddy bear.

Get the rope. With the teddy and rope go to the dalek screen. Teddy will open the right-hand side door, slowly. Go into that room and jump at the rope — it should expand.

Now go to the swimming pool screen. You can now collect the rubber duck.

Load the pop gun with the cork and go to the fort. Exchange the pop gun for the flag. With the flag and rubber duck, go to the seaside screen.

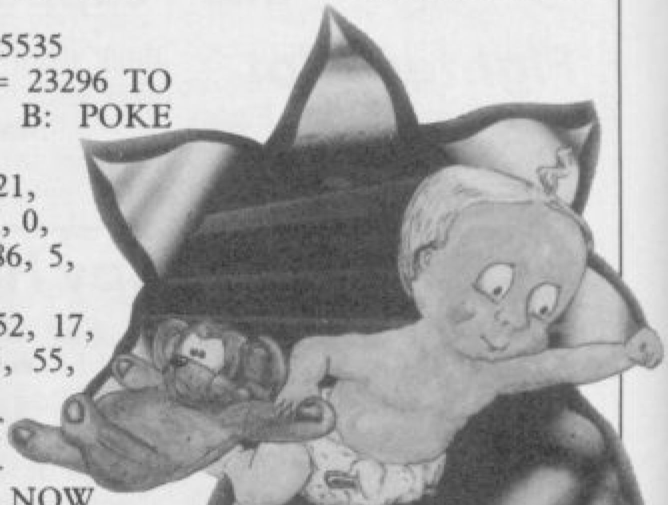
Exchange the flag for some pebbles and load the catapult. Combine the torch and bulb to fix the torch.

With the working torch and loaded catapult, go to the dark room and shoot all the ducks, except the flying duck. The toy caps should fall down.

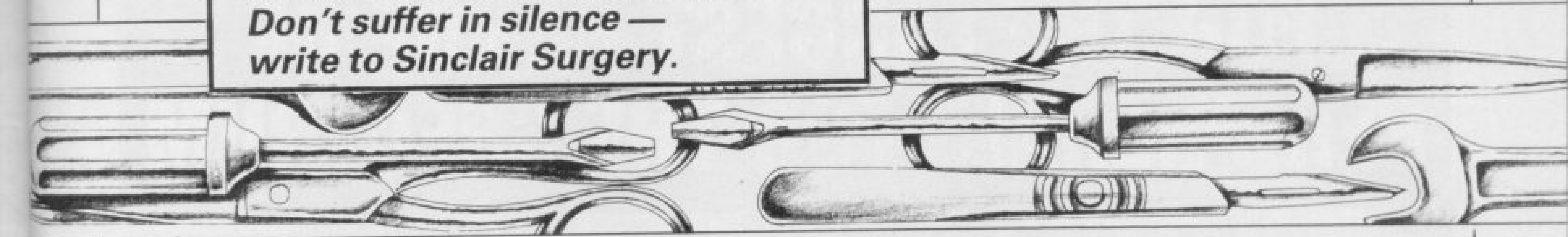
Below is a routine for infinite lives on **Herbert's Dummy Run.** Type in the listing and save it to tape. You can make the program autostart by using the LINE command — SAVE "name" LINE 10.

```
10 CLEAR 65535
20 FOR F = 23296 TO 23321: READ B: POKE F,B: NEXT F
30 DATA 221, 33, 0, 0, 17, 17, 0, 175, 55, 205, 86, 5, 221, 33, 224
40 DATA 252, 17, 63, 2, 62, 255, 55, 205, 86, 5, 201
50 PRINT AT 0,0; "INSERT TAPE NOW FROM START"
60 RANDOMIZE USR 23296
70 POKE 65093, 243: POKE 65100, 190
80 FOR F = 65271 TO 65299: READ B: POKE F,B: NEXT F
90 DATA 17, 128, 91, 33, 254, 83, 26, 174, 203, 164, 174, 203, 228, 18, 43
100 DATA 19, 123, 254, 154, 32, 241, 62, 48, 50, 213, 202, 195, 148, 91
110 RAMDOMIZE USR 65093.
```

Neil Zammit,
Rainham, Essex



**Acute add-on allergy?
Chronic hardware headaches?
Don't suffer in silence —
write to Sinclair Surgery.**



RS232 versus Centronics

I WISH to attach an Epson-type printer to my Spectrum Plus. I know that I will need a piece of hardware — an interface — but I am confused on which to buy.

I have sought advice from two sources; the first of which informed me that I would need a Sinclair Interface 1, and the other informed me that I would need only a printer lead.

**Gary Wells,
High Wycombe,
Buckinghamshire**

● *To use any full-sized printer with the Spectrum you will need an interface.*

There are two ways to drive a printer, Centronics or RS232; it does not matter which type you use provided the interface is of the same type as the printer. Centronics printers tend to be cheaper than RS232 and there are more Centronics interfaces available for the Spectrum. If, however, you intend eventually to buy a QL, which has a built-in RS232 port, it might be worth getting that type of printer.

Also, you should consider what you want to do with the printer. If you want to COPY the screen, check that the interface has suitable software; with Interface 1, which has an RS232 port, you will have to write your own.

The sound of silence

I RECENTLY attached the Currah Microspeech unit to my Spectrum Plus. I decided to try the device by putting the game sound of my recent turbo hyperload software through the TV. That is where things went wrong.

Every time the loader reached the hyper-click a flashing 'K' cursor appeared and the game stopped loading. Is Microspeech incompatible with turbo-loads? Is there a POKE to solve the problem?

**Keith Groat,
South Queensferry,
Clwyd**

● *The Currah Microspeech reserves a buffer at the top of memory and it is possibly that which is causing problems. Try entering PRINT USR 0, to reset the machine, or CLEAR 65535 to move RAMTOP before loading the game. If that does not work you will have to either get your soldering iron out or contact the manufacturer.*

New look for old Spectrum

IS IT possible to fit the Spectrum Plus upgrade kit to a 16K Spectrum?

**David Jarratt,
Abingdon,
Oxfordshire**

● *Yes. Any add-on keyboard will work with both 16K and 48K Spectrums.*

Better points of the Fox

I WISH to purchase a Fox programmable interface and understand that it can be used as a pseudo-ROM.

Can you explain how that works and what advantage this interface has over the others you have reviewed?

**Ann Burns,
Norwich,
Norfolk**

● *The Fox programmable joystick interface contains a 2K static RAM chip and a rechargable battery. When the unit is plugged into the Spectrum the battery is kept topped up from the Spectrum power supply. When you switch off, the battery retains the contents of the chip.*

Although normally the chip contains routines to set up the joystick you can put anything you like in it. It can then be loaded into the Spectrum memory at the flick of a switch.

Contact Fox Electronics Ltd, Fox House, 35 Martham Road, Hemsby, Great Yarmouth, Norfolk NR29 4NQ. Tel: 0493 732420.

Incompatible Tasprint

IS Tasman's **Tasprint** compatible with the Alfacom 32 printer and Interface 1, and if so what are the printer control codes?

**G A Davies,
Doncaster,
South Yorkshire**

● ***Tasprint*** *will only work with Epson compatible printers, and that excludes the Alphacom 32.*

Ceefax gets dumped?

I POSSESS a Sanyo television which has a DIN 5-pin socket for earphones. Also coupled is a video recorder.

For my 48K Spectrum I use an Epson FX80 printer. Is it possible to connect the Epson to the television in order to get a print of Ceefax?

**L R Flacke,
Cardiff**

● *The only way to copy a Ceefax screen is via the TTX2000 teletext adapter from Modem House. It has a screen dump to a Sinclair printer facility built-in, but copying to an Epson is a little more complex. Contact them at Iolanthe Drive, Exeter, Devon EX4 9EA. Tel: 0392 69295.*

Flexible connections

WHERE can I obtain an extender board for the rear of my ZX Printer interface, to allow me to connect my dead-ended Protek joystick interface at the same time as the printer.

**Nicholas Morrow,
Kirkton Manor,
Peebles**

● *Contact CLPS, Shire Hall, The Sands, Appleby, Cumbria CA16 6XN. Tel: 0930 52204. They sell a flexible three-way connector for £12.50.*

Dead flesh falls apart

I BOUGHT a Spectrum 48K at Christmas and noticed that the keyboard covering was loose. Does that affect the performance of the Spectrum in any way?

My real problem is that for about a month the Spectrum has failed to load any original tapes including **Horizons.**

**Jason McClurg,
Newtown Abbey,
County Antrim**

● *The keyboard cover simply needs sticking down again. The loading problems could, unfortunately, be caused by a multitude of things. As the computer is still under guarantee it is best to send it back for repair, and get the keyboard fixed for free at the same time.*

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SAVE £40

- 16K, 64K or 128K Wafers
- Twin 28K Drives
- Builtin RS232 and Centronics Interface port

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TIMEX 2040 PRINTER
For the ZX Spectrum



SAVE £40

- For Sinclair Spectrum/Spectrum Plus
- 80 cps output
- Uses standard Sinclair commands: LLIST LPRINT, COPY
- Self Test Mode

SALE PRICE **£37.50**

Reg Price £77.50

CHEETAH RAT REMOTE JOYSTICK
For the ZX Spectrum



- Infra Red
- Very fast touch control
- No moving parts -long life
- For all Cheetah Rat/Kempston compatible software
- Comfortable for long play periods
- With receiver / interface unit (plugs into Spectrum)

SAVE £5

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SALE PRICE **£24.95**

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Microdrive single cartridge	£1.99
Microdrive (4 pack)	£7.95
Microdrive storage case	£5.95
Wafer Drive cartridges	£2.47
16K Wafer drive cartridges	£2.79
128K Wafer cartridges	£2.99
Microdrive extension lead for Sinclair	£9.95

DISK DRIVES & INTERFACES

Sinclair Microdrive	£44.95
Sinclair Interface 1 (For Microdrive)	£49.95

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Omega D/R With free Azimuth Tape	£24.95
Sanyo Slim II	£29.95
Sanyo DR101	£34.95

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Cheetah 32K RAM	£39.95
Currah Microslot	£6.95

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Cheetah Megasound	£10.95
DK Tronics 3 channel sound synthesiser	£29.95
Currah Microspeech Synthesiser	£19.95

JOYSTICKS

Quickshot II	£9.95
Kempston Formula 1	£16.95
Joycard	£8.95

Not all stores carry every advertised item, please phone before making a journey.

CHAMP FREEDOM FIGHTER RADIO CONTROLLED JOYSTICK
For the ZX Spectrum



SAVE £20

- Instant response
- 20 foot range
- Contoured handle with 2 fire buttons
- Suction cups for one handed play

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RD DIGITAL TRACTOR
For the ZX Spectrum

SAVE £30



- User can trace irregular shapes & commit outlines to display file
- Tracer s/wre provides rapid graphics creation
- Displays can be saved on cassette or disk, printed or merged with user's own programs

SALE PRICE **£39.95**

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DK Tronics Single Port I/F	£9.95
DK Dual Port I/F	£13.00
DK Tronics Programmable J/S I/F	£22.95
DK Tronics Games Player Single port I/F (With switch to slow down programs)	£12.95
Kempston Single Port J/S I/F	£9.95
Kempston Professional Triple Port J/S I/F	£18.95
RAM Turbo Dual Port J/S I/F with ROM port	£22.95
RAM Single Port J/S I/F	£9.95
Datel Single Port J/S I/F	£9.95
Datel 3 Port J/S I/F	£12.95

PRINTER INTERFACE / LEADS

Kempston Centronics I/F (EPROM driven)	£29.95
DK Tronics Centronics I/F (Software driven)	£39.95
Sinclair I/F 1 to RS232 lead	£9.95
Rotronics RS232 Printer Cable	£9.95
Rotronics Centronics Printer Cable	£9.95
RAM QL Centronics Printer I/F	£29.95

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Sinclair Flat Screen TV	£99.95
Sanyo CTP3132 Clr TV	£199.95
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Shinecrest 450	£59.85
Shinecrest 500	£54.95
Shinecrest 600	£65.00

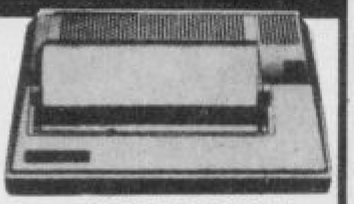
LIGHT PENS

DK Tronics Light Pen	£19.95

Prices correct at time of going to press E&OE.

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ALPHACOM 32 THERMAL PRINTER



- Full interfacing and separate power supply
- 80cps onto thermal paper
- No ribbons to replace

Reg Price £79.95
Save £20.00
SALE PRICE £59.95

DK TRONICS ZX Spectrum Keyboard

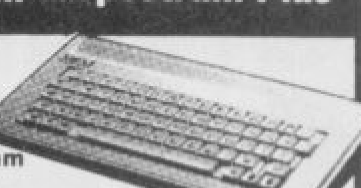
- 15"x9"x3" - Spectrum and Interface One fit inside casing
- 52 Side Stepped Keys and separate Numeric K/pad
- All rear connections except Microdrive (L/H side)



Reg Price £39.95
Save £10.00
SALE PRICE £29.95

SAGA 1 EMPEROR Keyboard for ZX Spectrum & Spectrum Plus

- 67 Keys
- Easy fitting - no soldering
- Light cream finish
- Low profile
- Pleasure to use



ONLY £49.95

DK TRONICS SINGLE PORT INTERFACE PLUS QUICKSHOT II JOYSTICK

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WHITEHAVEN P D Hendren 15 King St Tel (0946) 2063

DERBYSHIRE

ALFRETON Gordon Harwood 69-71 High St Tel (0773) 832078

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EXETER Seven Counties (Computers) Ltd 7 Paris Street Tel (0392) 211211
PLYMOUTH Syntax Ltd. 76 Cornwall St Tel (0752) 28705
TIVERTON Actron Micro Computers 37 Bampton St Tel (0884) 252854

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DORCHESTER Seven Counties Cptrs 20 High Street East Tel (0305) 66022

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Software reviews carry a star rating, the basis of which will be value for money. Programming, graphics, speed, presentation, addictive qualities and the rest are taken into account.

Guide to ratings
★★★★★ 24 carat. Buy it
★★★★ Value for money
★★★ Nothing special
★★ Over-priced
★ A rip-off

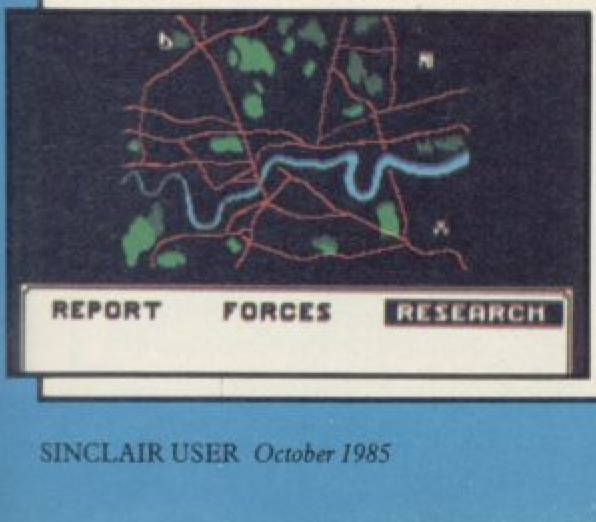
The Rats

MAN'S WORST FEAR waits eagerly in the darkness. The scent of human blood is overwhelming and the taste of cool, moist, rubbery flesh is still remembered and savoured. The time is near for the invasion of **The Rats.**

The game, from Hodder and Stoughton which publishes the book of the same name, is an experience as well as being a menu-driven adventure with a touch of strategy. It loads in sections, the first being a demo program with a nice line in cellar graphics. The sound is not too hot, but the excellent and superbly fast animation sequence, in which a torch scans a watery cellar to reveal hundreds of the plague carriers, is one of the best I have seen.

Once the demo is over, or if you break out of it, the main game is loaded from random routines on the first side of the tape. Loading is confusing as the main operating system of the game chooses the sections to be included within the program at random. Therefore, some of the code on the tape does not load and, if you are a first time user, you may think that the tape is faulty. It is not an error, the tape is loading in the random encounters for the game.

Once the game is running you had better be prepared for some fast action. There are two levels of play, over which the computer has total control. The first level involves a number of scenarios which deal with minor characters. As in James Herbert's book, those people are expendable and can be sacrificed for information about the mutant rats.



Those scenarios are heralded by a warning siren. The screen then splits into three windows, the largest of which displays the action as text. The long window on the left provides command options and the one at the bottom of the screen is your command window. Making your character act is simple — just construct a command sentence at the bottom of the screen using the options provided. The effect creates a feeling of tension as you do not know what options are available until a specific menu is displayed.

SINCLAIR USER CLASSIC



If you are unlucky enough to meet a rat, it can kill you in a number of ways. First it might rip through the screen and bite you or, alternatively, it could try to rip through the text with its claws. Once an attack is made, a human face, full of terror, is shown falling from the rip in the page.

It is possible to escape your fate as one of the minor characters. For instance, the little girl doing her paper round would be better off if she did not go into the house across the road, but then you would not discover the rats' secrets.

The major characters, including Harris and Foskins, are just as vulnerable to attack as the minor characters. In some situations, Harris must be mercenary and let the rats kill friends in order to gain information about their habits. For example, when he goes to capture a rat he must make sure that his companion leads the way — the leader becomes a rat victim.

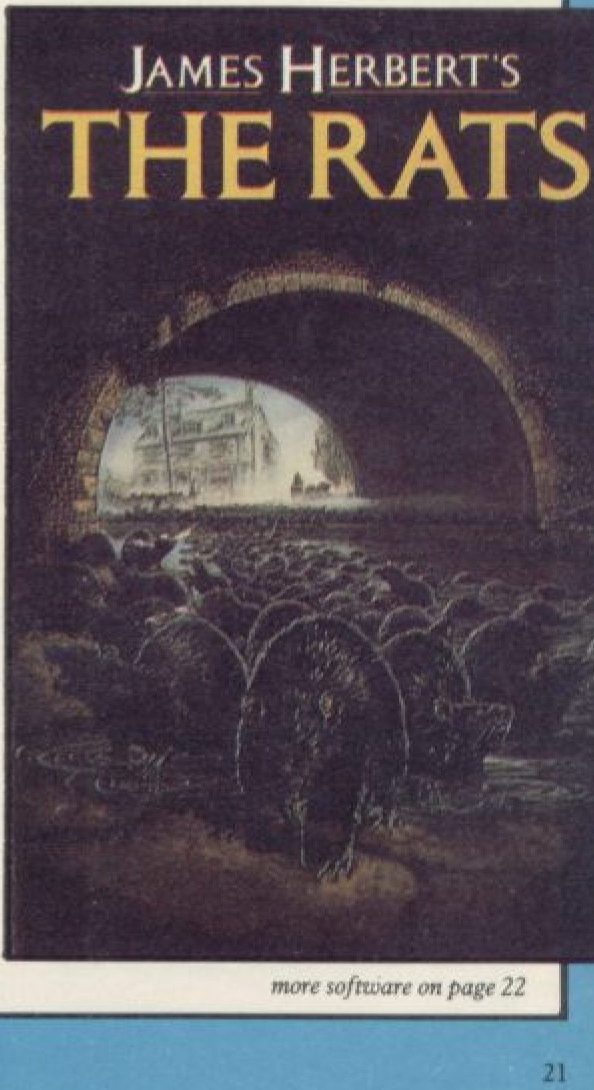
The other part of the game is a contest between the rats and Government forces. You are in charge and must allocate resources on a giant map which shows the spread of the rats through London. If they go over the boundaries you have lost the game, just as you have lost if one of the major characters is killed.

You use icon menus to allocate forces and resources. Those go into action on the part of the map which you have indicated with your cursor. At the same time you must specify the research into the rats' behaviour.

The Rats is a complex and brilliant game with above average graphics — if minimal sound. I can recommend it without reservation to those with strong stomachs.

John Gilbert

Publisher Hodder and Stoughton
Price £7.95 **Memory** 48K
Joystick Kempston, programmable
★★★★★



more software on page 22

Komplex City

PRETTY CLEVER aliens, the lot in **Komplex** — they've built a vast maze of a city to test our resources. Naturally you're unable to resist the challenge, so it's into the mazes of **Komplex City** for another bash at convincing the aliens of humanity's superiority.

Legend's series of shoot-'em-ups got off to a shaky start with **Komplex,** but the sequel more than redeems earlier disappointments. **Komplex City** is fast, long, and, as its name suggests, complicated.

The maze of tunnels has over 65,000 intersections, and there are several trillion possible mazes — you can change them by typing in a name for the maze at the beginning. Then, every time you use the same name you will get the same maze.



To help you there are a number of on-screen scanners and the like. The long and short range scans show how far away from the targets you are — there are 11 to collect.

Another display shows what lies just ahead in the tunnels. At each intersection you can choose your direction, or whether to go into hyperdrive. You may also get an opportunity to increase your score, make a short jump or restore your shields — with the exception of jump, those involve maximising the size of bar graphs or the amount of green on the screen. It is what lies ahead in terms of shields, score bonuses or jumps that is shown on the display, and you will have to plan carefully to make the best use of those options.

Hyperdrive is great fun. The screen suddenly bursts into colour and various mushroom-like baddies come at you. Some are animated, with ports opening and guns extending to blast you. Hyperdrive is costly on the shields, but vital for completion of the game in less than a month.

The tunnels themselves are done in wireframe graphics, with aliens coming at you at some speed. While there is little new about the graphics style it



is extremely effective, and the flashes and various stuttering sounds indicating gunfire or damage are not so obtrusive as to hurt the eyes — a boon to reviewers at the end of a long week of zapping. You can switch off the sound or the flashes anyway.

One particularly good feature is the autopilot, which actually plays the game for you and can be cut in at any time. It's not a very skilled autopilot, and you will have little trouble in doing better yourself, but it does provide a good way of learning how the game is played.

Legend has clearly put a lot more care into **Komplex City** than into recent products, and that attention to detail has paid off. You probably won't want another shoot-'em-up this side of Christmas.

Chris Bourne

Publisher Legend **Price** £9.95
Memory 48K **Joystick** Sinclair, Cursor, Kempston, AGF
★★★★★

Nightshade

HERE COMES Ultimate once more with the continuing saga of Sabre Man.

Nightshade is, as you might have begun to suspect, more of the same — the brilliant 3D graphics system of **Knight Lore** and **Alien 8** juiced up and improved to simulate a mediaeval village. Somehow the programmers have managed to get colour into the screens.

In order to see your little hero in the narrow village lanes one or two walls drop out of the picture, remaining as white lines on the screen. That system does, however, allow for some wonderfully detailed views of inns, barns and the like.



As usual with Ultimate there is little information on what you are supposed to do. The village is said to have been possessed by a great evil, which turned the inhabitants into werewolves and other hideous creatures. Those monsters are some of the best yet, coming in a tremendous variety of shapes.

Your weapons lie in the village rooms and you collect various missiles to stock up your ammunition. Some will not do you much good — there are monsters which transmute into others if hit, or split into two, and it's going to take you some time to establish which does what to whom.

Meanwhile, there are four hypernasties — a mad monk, a skeleton, a ghost, and Mr Grimreaper, death himself. They are scattered about the village, and must, we suppose, be sought out and destroyed, presumably with four special objects, the eggtimer, Bible, Hammer and Cross.

The game is well-paced — very much an arcade-style production compared to the logic puzzles of the two earlier Filmation games

On the other hand, there is a sense of *déjà vu* creeping into Ultimate games. It's now well over a year since Sabre Man first appeared, and the concept is wearing a little thin.

Nightshade looks a lot different from **Knight Lore** and **Alien 8,** but not so different as to stifle doubts that Ultimate may be running out of steam. Or dare we hope for something really special this side of Christmas?

Chris Bourne

Publisher Ultimate **Price** £9.95
Memory 48K **Joystick** Kempston, Sinclair, cursor
★★★★★



PREVIEW

Shadow of the Unicorn

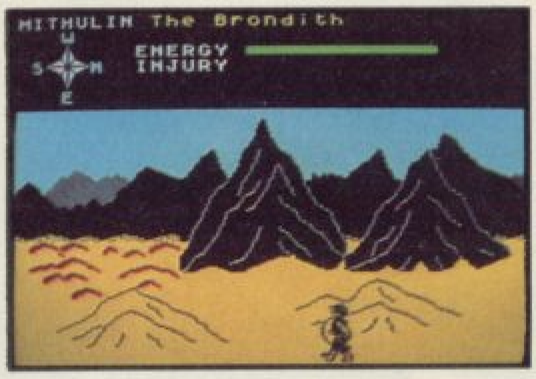
Buried somewhere in a mythical land — strongly reminiscent of Tolkein's Middle Earth — lies a book, which is the root of all evil. One horrific day, a young innocent stumbles across that weighty tome, and opens it — the evil spews forth to desecrate the land.

The main object in **Shadow of the Unicorn** is to retrieve that book from whoever holds it, seal it and hide it away. However, there are a number of sub-plots revolving around the 10 central characters which must be completed. For instance, the Queen Kielmath has been overtaken by evil. You must persuade her to join your side as she plays a vital role in the game.



You control all 10 characters, each of which have separate abilities, ranging from magical to healing powers. Some, like the dwarfs, work well with their hands, others, like the woodmen, have a great affinity to all living and growing things.

There are three main characters —



Avarath, chief wizard; Mithulin, King of one kingdom and Kielmath, Queen of the other. The game ends if the energy levels of any of those three run down. Happily, that is restored by eating the berries off a magical bush which grows in some profusion. It does not matter if one or two of the remaining characters die, although without them your quest will be harder to complete.

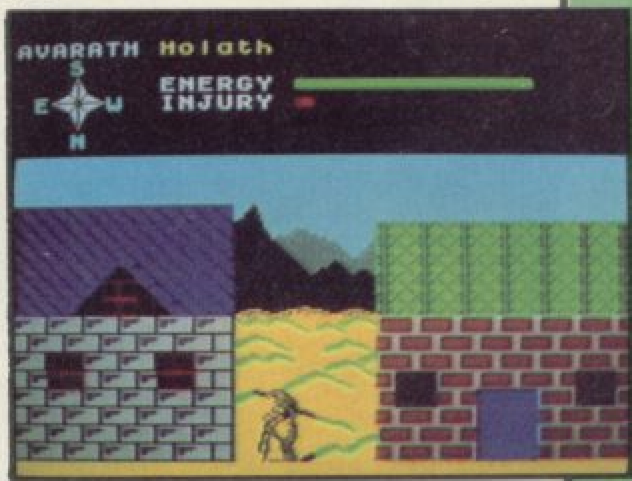
The game comprises vast panoramic views — rather like **Lords of Midnight** — with bright colours and detailed graphics. There are 2,816 screens and over 11,000 views.

You can travel only to the east or west but not north to reach the forests, buildings and mountains in the background. Mikro-Gen has come up with a neat solution. If you want to travel forwards, revolve the scenery by facing another direction. That brings the place you want to investigate on an easterly or westerly line.

The graphics are marvellous — and should be even better once the game is completed. We saw a pre-production copy which was impressive, although some final touches had to be added. There are battle sequences, spells to cast and objects with magical properties to pick up as you venture deeper into the land. The characters interreact with each other and, unlike the Wally games, while you are controlling one, the others remain static — they do not wander off to do their own thing behind the scenes.

Shadow of the Unicorn should keep you occupied for hours as there is so much to do and see. It costs £14.95 and is the first game to use the Mikro-Plus — Mikro-Gen's little black box of tricks which increases the Spectrum memory to 64K. An illustrated book provides the background, and a number of clues lie within those pages.

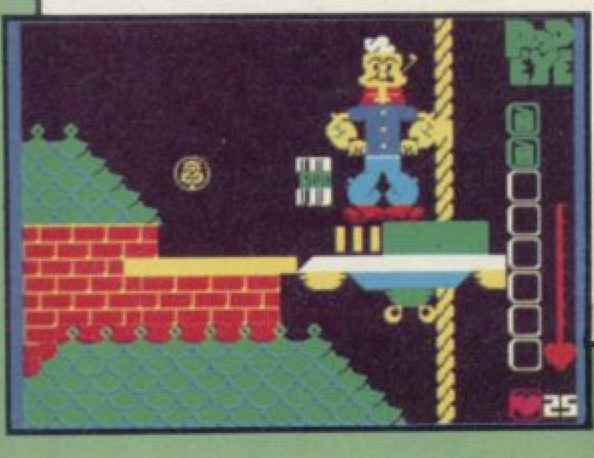
Clare Edgeley



Popeye

HELP POPEYE save Olive! Olive Oyl stands at her window waiting for her man to bring her hearts. Meanwhile the massive frame of Bluto thunders across the screen as he lies in wait for Popeye.

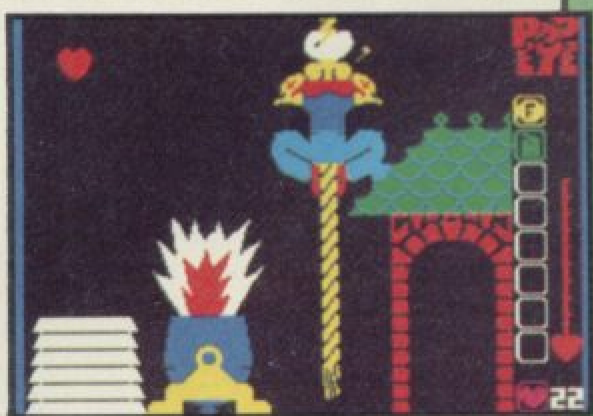
The essence of **Popeye** is to find all the hearts and return them to Olive before her lovemeter runs out. He must also collect spinach cans, keys and an assortment of objects to aid him during his journey.



Spinach is the only way to revive Popeye following a blow from Bluto, vultures, witches on broomsticks and so on. Keys are needed to gain access to the chambers and rooms where more objects and obstacles lie.

To reach the various objects Popeye can jump, climb up and down ropes and hitch lifts. Be bold and adventurous and you will be rewarded with even more locations to explore.

At first the game is tedious. Popeye is so slow in response to your commands that he is mowed down even as he is recovering from a blow. Once you have adjusted to the slightly slow reactions and cracked the correct sequence to avoid Bluto, you can really start getting into the game.



The graphics are excellent and very large. Popeye, Olive Oyl and Bluto are all perfect reproductions of the famous cartoon characters.

Colette McDermott

Publisher DK Tronics **Price** £6.95
Memory 48K **Joystick** Any
★★★★

more software on page 26

RIDDLERS DEN

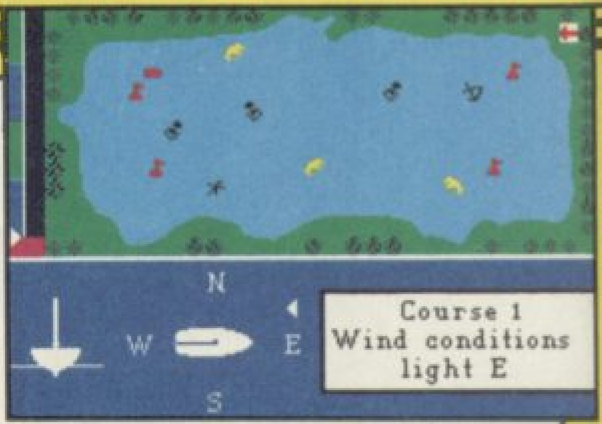
Available on the 48K Spectrum from Electric Dreams Software.
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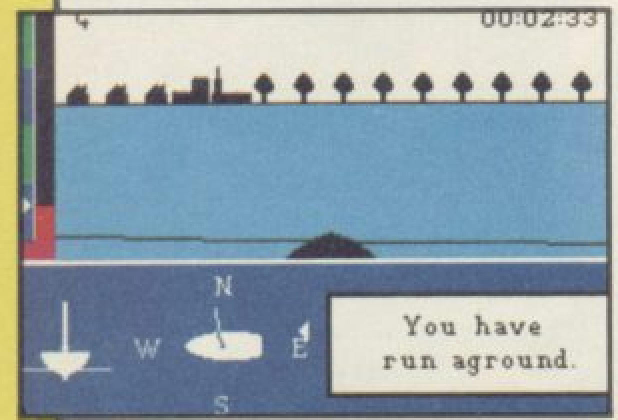
Spectrum Software Scene

Yacht Race



THE HOLIDAYS are over, and the summer? — well that never began. But why not spend your autumn evenings learning the skill of yachting made easy with **Yacht Race**.

Even Simon Le Bon could handle this one and he does not need to have insurance either. Impress your friends with your knowledge, and make up stories about sailing stormy seas and how you almost won the Americas Cup last year.



Carefully planned levels allow you to build up your skills step by step. In the first three levels you learn the basic skills of steering, trimming the sails and balance. Having mastered those you can pit your knowledge against the computer boat. Finally you compete against Black Streak, where the pedalo mob is weeded out from the true sailors.

The main screen can be toggled to a map which plots out the water, showing your present position and the dangers — buoys and sand banks — which surround you. You never actually see your yacht — only the bows — but if you change direction or lose balance you will enjoy a simulated drowning!

Yacht Race is great fun and gives a real insight into the world of sailing. A booklet is also enclosed, giving tips and clear, easy-to-read, instructions.

Colette McDermott

Publisher Five Ways Software
Price £6.95 **Memory** 48K
Joystick Kempston, Sinclair
★★★★★

Red Arrows

FLY WITH the Red Arrows and keep your stomach intact as you perform the amazing Manhattan Loop, the Pyramid Roll and the famous fly past.

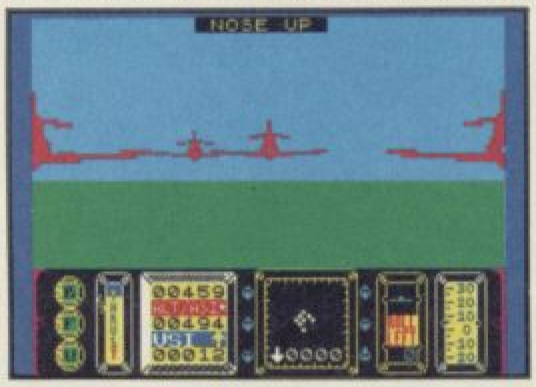
The game is a flight simulator with a difference. You are accompanied in the air by your team mates, and you must perform aerobatics to the best of your ability in order to score points.

Don't look so worried. You are not left to your own devices in the air. A training routine has been included within the program which displays your instructions as you make a fly past. Failure to heed instructions usually results in a crash.

The instruction routine does not, however, help with the 16 different key combinations which you need to control your Hawk aircraft. Out of desperation I just used the thrust and roll keys which seem to achieve good scores, and only the occasional crash.

Graphics may not be the game's strong point but the simulation is accurate to the degree of seeing the aircraft of your team mates fly past.

The flight instruction and aid does not end with the instruction routine.



Your team leader will give you instructions if you are going off course. The amount of instruction given to you during flights may seem unrealistic, but open communication must be available between pilots so that wing tips do not touch and you don't drive your aircraft into the ground. Your team mates will look after your safety just as you watch theirs.

Red Arrows turns the dull area of flight simulation into fast and furious fun. Database Software has also arranged a competition in which you could win a weekend to visit the real Red Arrows.

John Gilbert

Publisher Database Publications
Price £8.95 **Memory** 48K
Joystick Kempston, Sinclair, programmable
★★★★

Tinderbox

GREMLIN GRAPHICS is not a company noted for its adventures.

Tinderbox is a fairy tale, in which you play the part of Tom, a common foot-soldier, who has to defeat the wicked witch and evil king to gain the hand of the fair Rowella.

As an adventure, it's a disgrace. It is written entirely in Basic, and contains large numbers of boring locations where little or nothing happens.

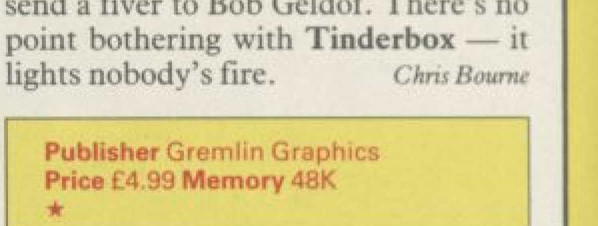
The computer does not understand even a simple, standard adventure command such as Look. As Tom happily wades through a lake without so much as getting his feet wet, he may well ponder his bad luck in not signing up as a mercenary with Pete Austin or Brian Howarth.

The B side of the cassette contains a long fairy story printed up screen by screen. It is the story of Tom, the common foot, and you've guessed the rest already.

All profits go to the Soft-Aid appeal for Ethiopia. It's very fine of Gremlin Graphics to do that, but they might have chosen a halfway decent program to flog for charity. If you care about Ethiopia — and you should — then send a fiver to Bob Geldof. There's no point bothering with **Tinderbox** — it lights nobody's fire.

Chris Bourne

Publisher Gremlin Graphics
Price £4.99 **Memory** 48K
★





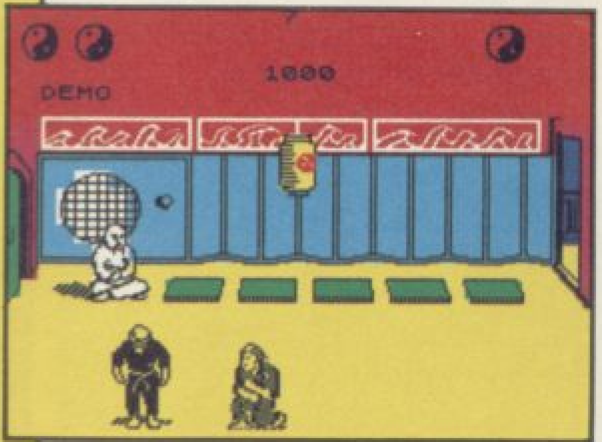
Way of the Exploding Fist

UTTERING a bloodcurdling ki-ai, the black-robed ninja hurled his muscled body against the evil sensei of Mel-Bon ryu. A series of percussive kites was countered by the feared 'attack of the astral Ho-Bits'.

Reeling from the force, the ninja leaped instantly into the air and brought his calloused feet, like twin axes, down on his opponent's joystick. In a wail of agony the sensei, Spectrum, Ferguson 12" and all went down in a mess of black wires, crushed cartilage and broken Quickshot II.

Melbourne House has gotten all bloodthirsty for its latest, a simulation of karate which offers 16 different moves and an extremely tough series of opponents.

Everything is joystick controlled, and you'll find a stick essential for any chance of success. The moves allowed are split into two sets. The normal eight joystick positions translate into movement backwards and forwards, two punches, crouching, jumping and somersaults, forward and back.



With the fire button held down, the eight positions become more aggressive. Three kicks, high, low and mid, form the basic arsenal, with a spectacular flying kick thrown in. You can also sweep from the crouching position forwards and back, or produce the well-known roundhouse kick, which involves spinning round and

SINCLAIR USER CLASSIC



catching the enemy on the jaw with the back of the heel. There's also a straight back-kick.

The key to the game's addictive playability is the intelligent way those actions are planned, so that once you are familiar with the controls, the movements are logical and instinctive.

Graphics are pleasing too. The animation of the two fighters is near perfect, with a satisfying crunch as foot connects with bone. It's sufficiently sophisticated for you to be able to hit your opponent while he's in mid-execution of a move, allowing for feinting tactics. Virtually all the moves can be aborted halfway through and turned into something else; in short, the variety of strategy possible is remarkable for an apparently simple arcade game.

The backdrop of each round is suitably Japanese in flavour. A short, balding instructor looks on as you fight under the cherry blossom, or across the tatami mats.

You start as a novice and must win two rounds to progress to first Dan, and so through to tenth. The first round is relatively easy, and provides good practice, but life gets tougher, and you need all your cunning to survive for long at higher levels. Each round is scored, and has a time limit. You must get two full points to win, symbolized by yin-yang circles on the screen. To score a full point you need to be perfect in your attack.

As a sports simulation, this is one of the finest and most realistic we have seen. As an arcade game, it's addictive and pacy. As a product, it's clearly destined for the top. *Chris Bourne*

Publisher Melbourne House
Price £8.95 **Memory** 48K
Joystick Sinclair, Kempston
★★★★★

Talos

TALOS stomps across the pleasant pastures of rural England to recover the Crown of Eternity, and restore balance to nature or some such nonsense. All the little furry squirrels and chirpy grasshoppers are going bananas, and the old battle robot is the last chance of stopping the rot.

Trouble is, Talos has been dismembered and lies scattered in seven pieces. You start with just the great metal hand, and must find the other bits to reassemble yourself before finally getting the crown.

The screen shows fields surrounded by fences, and the occasional stretch of road — there are over 200 such screens, fairly spacious, in which the rabid creatures appear. Your main problem is running out of energy, which can be restored by collecting coins, candles, and parts of your body.

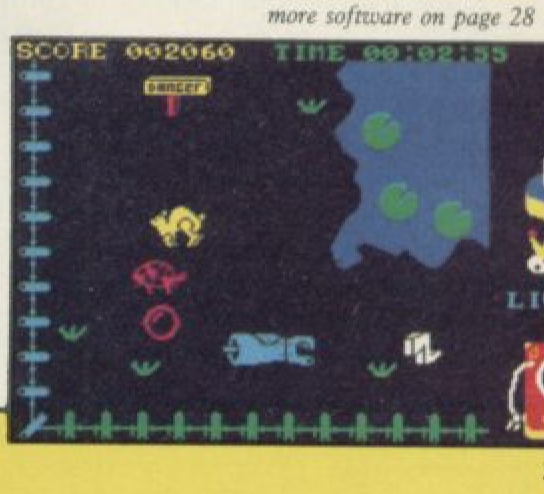
You get a magnet which you can drop and which activates the compass, bottom right of the screen. It is a useful marker if you find part of your body but, alas, not one which will link up with what you have already.

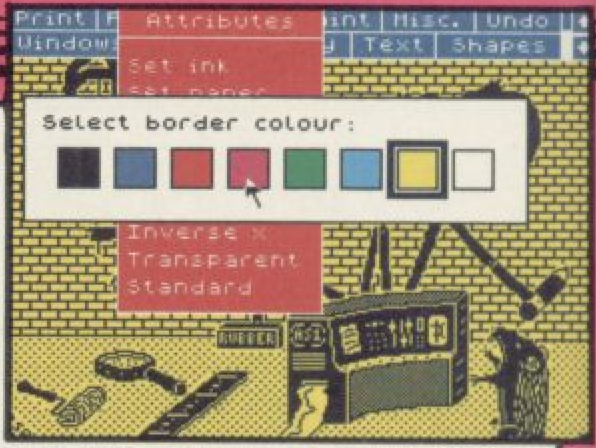
Talos is a highly competent maze game, though not exactly original. The monsters are not much of a problem, and you can usually ignore them if you move swiftly enough. More important and difficult is the business of finding all the various bits and pieces. Some only appear after others have been found.

What is fun is the way the robot changes each time a new part is added. It provides a good incentive to find the next piece, and we expect you will be clamouring for infinite lives POKEs before very long. *Chris Bourne*

Publisher Silversoft **Price** £7.95
Memory 48K **Joystick** Sinclair, Kempston
★★★★

more software on page 28





EXCLUSIVE

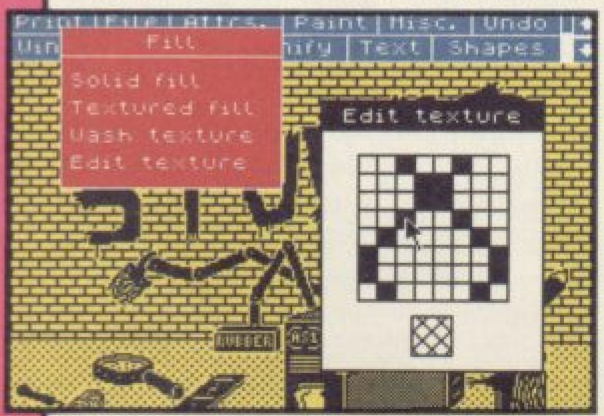
Art Studio

LAST MONTH I reviewed **The Artist,** from Softechnics, and said there was nothing which could beat it.

I was proved wrong. **Art Studio,** from OCP, outclasses it in speed and style. Once loaded from disc or tape, the program display is set to white with a blue double-decked bar menu across the top of the screen. Near that is an arrow cursor which can be manipulated using the keyboard, joystick, or Kempston mouse.

To select an option on the menu, the cursor must be moved over it and the fire button pushed.

As well as being able to draw single lines, by placing two points on the screen with the cursor, you can extend lines to create shapes such as triangles and elastic banded lines. Elastic banding starts from a specified point. The potential line is then dragged across the screen by the cursor and set in position by pressing the fire key.



Once you have produced your drawing you can start to fill it in with solid colour or one of the textures provided on the FILL menu. Those include roof slates, brick structures, lines and dots.

To produce a fill effect, all you have to do is put the cursor inside the shape, and press the fire button. The shape is first filled with a backdrop of colour and the texture is then dropped in.

SINCLAIR USER CLASSIC



The most impressive part of the package is its ability to cut and paste parts of screen pictures. That process is accomplished using windows. You must first put a window around the shape which is to be transferred to another part of the screen. Then choose one of two options. The first allows you to do a straight copy of a shape, the original remaining on the screen. The second performs nearly the same operation but the original is cut out and a hole left on the screen.

While the cut and paste up operation is taking place it is possible to change the scale of the shape along the X and Y axes. To do that, open a window using the cursor, set it to the position in which you want the new shape to appear and make that window larger or smaller.

The only problem when using windows to achieve those results is that a rectangular patch is left in place of the shape. The screen then has to be retouched with the package's pen.

Apart from that one flaw, the package out-performs **The Artist** in almost every way. It has superior speed to the Softechnics package and the menus are easier to use. It can be used with disc, tape or microdrive and contains a printer driver which handles most compatible Spectrum printers. It is an extremely powerful utility which should be of use to professional artists and designers as well as the home user. *John Gilbert*

Publisher OCP
Price £12.95 (cassette version, Opus disc/microdrive); £19.95 (cassette/disc version) **Memory** 48K
★★★★★

Operation Caretaker

IT IS OFTEN impossible to know what to do if a program crashes, or won't load. How many times can you face taking a duff tape back to the shop and asking for a new one?

What many people forget is it could easily be the tape recorder causing the problem. Tape is grotty stuff. The oxides rub off on the heads and make a mess – it's like sandpaper. Also, the heads come adrift and change position. The alignment of the heads is called the azimuth, and Global has produced a piece of software to cure all ills.

Operation Caretaker contains two cassettes and a screw driver. One cassette is a tape cleaner, a strip of fibrous material which rubs against the heads and collects the filth.

The second cassette is a program which sends out a steady stream of data and then interprets it. The data is sent through at a high speed to make it difficult to read, and a display shows you how many bytes were accurately read. You then stick the screwdriver into the azimuth screw on the tape deck and twiddle it until the readings are as good as you can get.



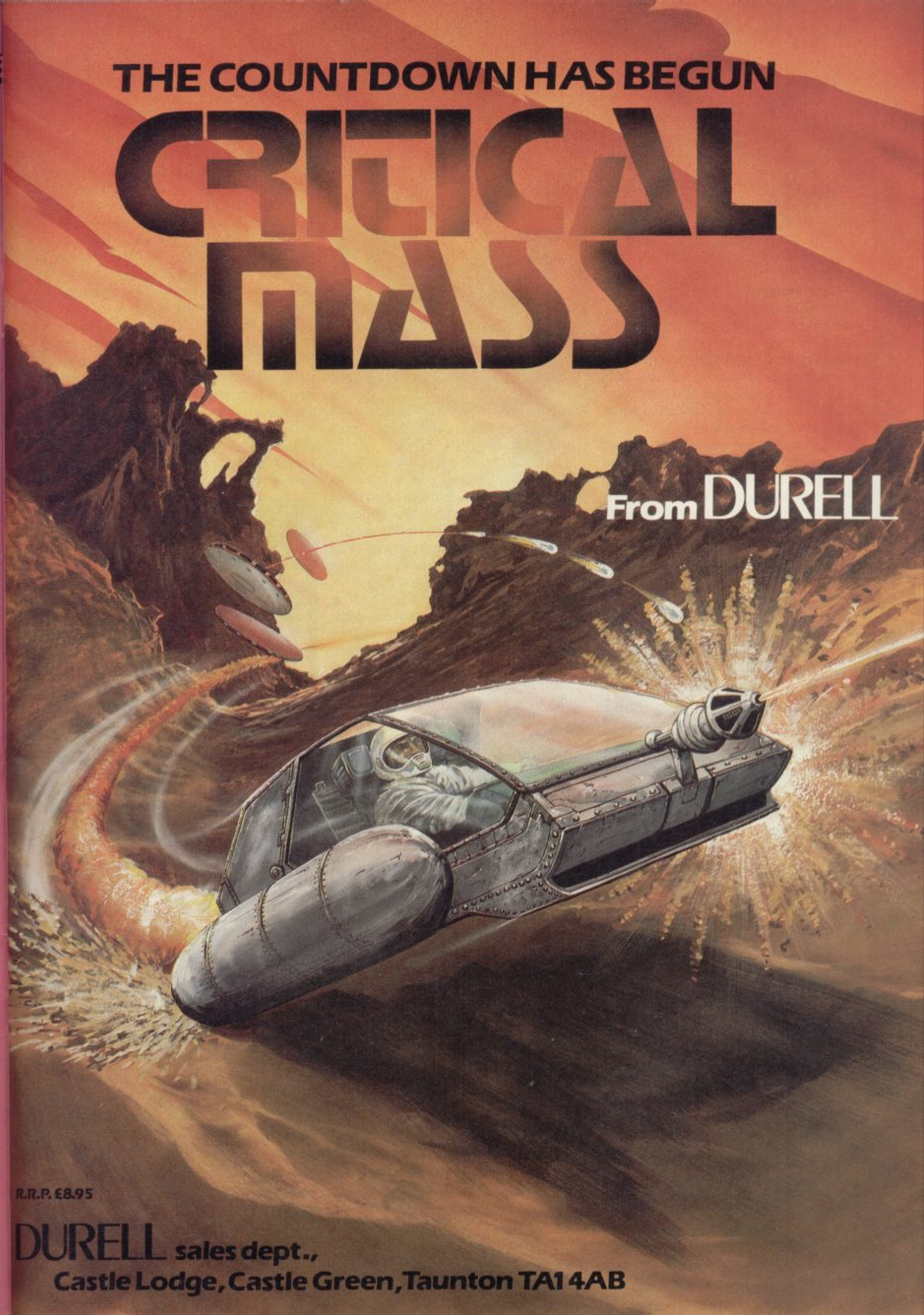
They tend to be a little different on each side of the tape, which is confusing, but there should be a narrow area where both are at their best. That's the point you want. As far as we could test it, the program seemed to work.

Of course, the program is fairly useless if you haven't got a cassette recorder with a little hole in it for adjusting the tape heads.

The package will remove a great deal of aggravation with tapes which won't load. Next time you go down to the shops to complain, you'll know you're in the right. *Chris Bourne*

Publisher Global **Price** £9.95
Memory 48K
★★★

more software on page 30


THE COUNTDOWN HAS BEGUN
CRITICAL MASS
From DURELL
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Dam Busters

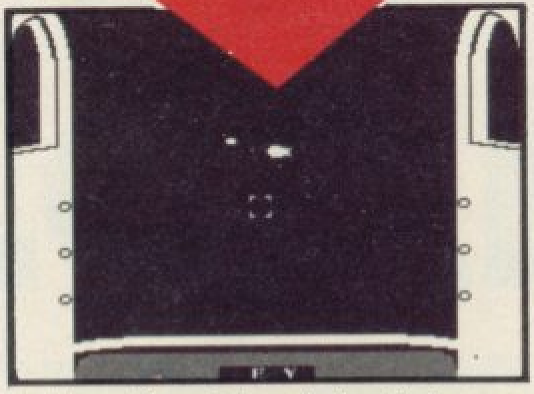
YOUR TARGET is Germany's dam system, the object is to blow them out of the water. The result is the destruction of the military and industrial infrastructure of the German war machine.

Dam Busters is not just another flight simulation with added special effects. During the game you have to play the part of the pilot, front and rear gunners, bomb aimer, navigator and engineer. You must do all that while flying through enemy territory, continually lit by searchlights while being buffeted by flak.

You must guide the aircraft off the ground and head towards France and Germany. You will have to liase with your engineer to make sure that the engine thrust is not to great. If it is the engines will catch fire.

As navigator you must use the maps to pinpoint your position and get the pilot to alter course if necessary. It may appear to be a simple job but you will also have to pilot the aircraft while

SINCLAIR USER CLASSIC





looking for cities, industrial complexes or dams.

The front and tail gunners have similar jobs. When you get to an enemy complex you must take on their roles and fire at searchlights, balloons and enemy fighters. The pilot should be wary of flying too near towns even if your natural inclination as a gunner is to blow everything to bits.

If you do not keep a keen eye on your instruments you could stall, overheat, fly through enemy soil or end up swimming back to England.

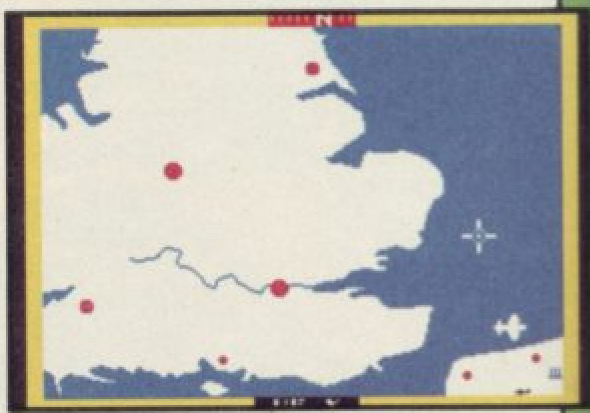
Each crew member has a screen full of instruments which can be controlled by joystick or keyboard. You must look through all of them at regular intervals. The game is not, however, as impossible as it seems. The controls are touch sensitive and the aircraft is easy to fly. Attacks from enemy guns and the glare of the searchlights can be handled quickly if you even have only a few flying hours' experience.

When you have found a dam your approach should be carefully timed. You must have developed the ability to be at 232 mph, have an altitude of 60 feet and be exactly 800 yards from the dam when you drop the bomb. The practice approach available should increase your skill.

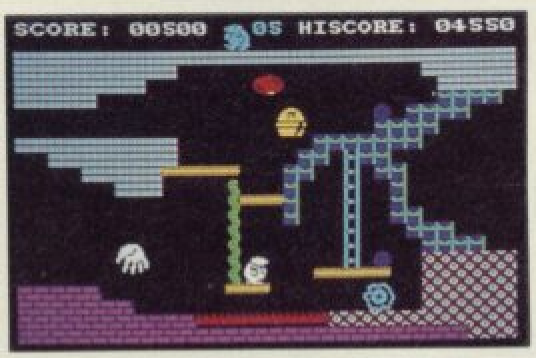
Dam Busters is excellent three-in-one entertainment which can be recommended to anyone. Arcade, strategy and simulation addicts will find all they require is just the push of a fire button away.

If you don't want to risk your luck in the air you could always go for the Lancaster kit offer from Airfix, included with the package. *John Gilbert*

Publisher US Gold **Price** £9.95
Memory 48K **Joystick** Kempston, Sinclair, programmable
★★★★★



Monty on the Run



INNOCENT or not, Monty has escaped from gaol and plans to flee the country aboard a waiting ship in **Monty on the Run.** From the safe house he must get through the maze of tunnels and sewers, picking up cash and objects en route.

He needs cash for his new life and objects to help him through the dangers that lurk in the maze of platformed areas. Not all objects will help him — some are extremely dangerous to Monty and some completely useless.

Cash lies about the place — heavily guarded by nasty teapots — together with bouncing grandmother clocks, Hush Puppy dog lookalikes, machines which will flatten Monty and low flying insects. As he goes through each section the nasties become more bizarre.

Climbing up ropes, jumping across lakes and somersaulting onto platforms, are all within Monty's capabilities. Each of his skills are constantly tested throughout the game as the nasties stamp about after Monty.

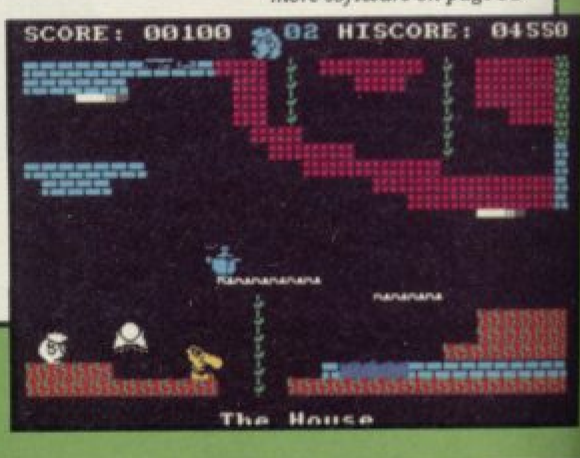
The animated graphics are a great improvement on the early Monty games. No doubt the quality of this new game will ensure that we will see a mole lot more of Monty games.

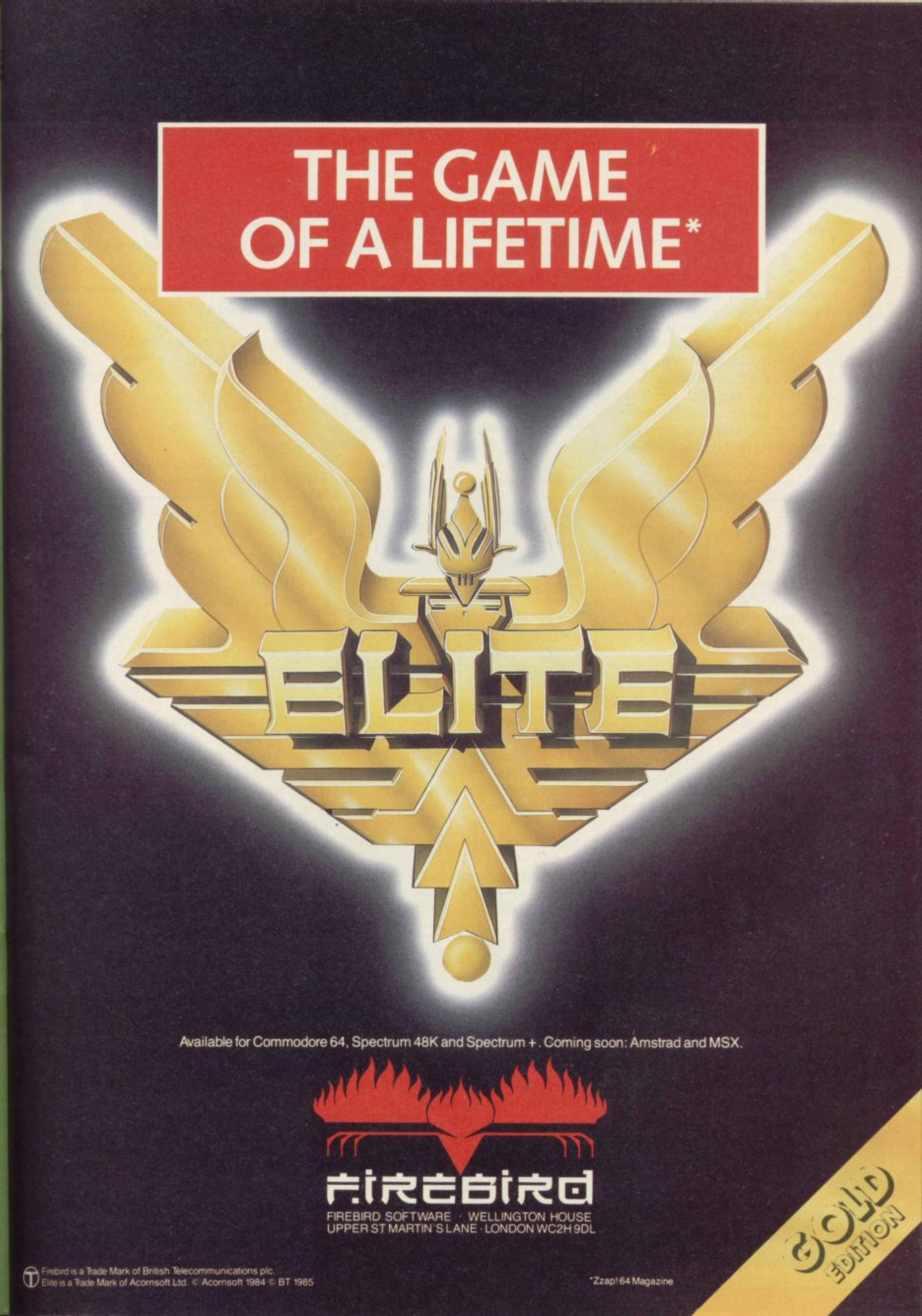
Colette McDermott

Publisher Gremlin Graphics
Price £7.95
Memory 48K **Joystick** Kempston, Sinclair
★★★★

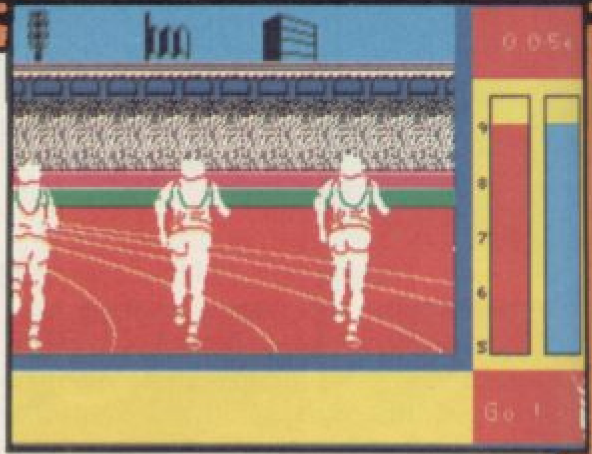
more software on page 32






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*Zzap! 64 Magazine

Run for Gold



SUPERB, life like, graphics have been used in **Run for Gold**, the latest offering for armchair athletes.

You must compete in the 400 meters, 800 meters and the 1500 meters. Qualify first in the local races before entering the main events which lead to the Olympics and gold medals.

Although you can control the speed of your athlete as you guide him through the bends and straights, you will do better if the computer does the steering for you. In both the 400 and 800 meters you start off on a bend, and your wobbly-legged hero has no intention of staying on the track unless you let the computer play too.

Other athletes are a problem — they all look like your boy, and when they all stand together waiting for the starting orders, panic grips you. Which one is mine?

Legs rise and fall, calf muscles ripple and the race is on. Using the joystick, speed is produced by pushing full forward — but wait, he does not seem to be moving any faster.

The answer lies at the side of the screen in two box scales — one for energy level, the other for speed. It is only from those boxes that you have visual evidence that his energy and speed are indeed increasing or decreasing.

Even when the scales tell you that he has run out of both resources he still glides along the track! What a shame after producing such truly gold medal standard graphics.

If you want the finger aching action found in **Daley Thompson's Decathlon** you will not find it here.

Colette McDermott

Publisher Five Ways Software
Price £7.95 **Memory** 48K
Joystick Sinclair, Kempston
★★★

Pole Position



OH NO! Not another racing car game! Despite **Pole Position** being a direct descendent of the famous arcade game it is still hard not to be cynical.

The game begins with a qualifying lap to determine which one of the eight grid positions you take for the race. Score, time left, speed, gears and laps completed, are displayed throughout the trial and race.

You have a view of the race from the rear of your car and control the steering, gears and brakes. What about speed? That increases at a set pace only as long as you remain on the track.

Racing through the straights and chicanes, you must qualify within a set time. Your car will be replaced following each crash until your time runs out.

It always seems that you reach a respectable speed — 200 mph plus — when approaching a bend. Attempting to brake and pass a car usually sends you careering off the track towards a lurking roadsign. Crash! Ugh! Fun?

Having qualified you now compete in the main race. The same obstacles appear, although there are more of them.

Points are scored in both events for remaining on the track and passing rival cars. Upon successful completion of the race you are awarded extended play. To make the game more challenging, your time limit drops each time you finish a race, your car speeds up and more cars and roadsigns appear.

Generally the graphics are good; your car does look like a formula racing machine. Flickering red and white lines mark the edge of the circuit and give a realistic illusion of movement to the game. There again, that also makes for uncomfortable viewing.

What lets the graphics down is the untidy sequence following a crash. On impact, the car explodes and is slowly replaced by a new one. Vital seconds are lost.

Be warned. If you like to play games where 10 fingers are never enough you won't enjoy this one. So steer clear.

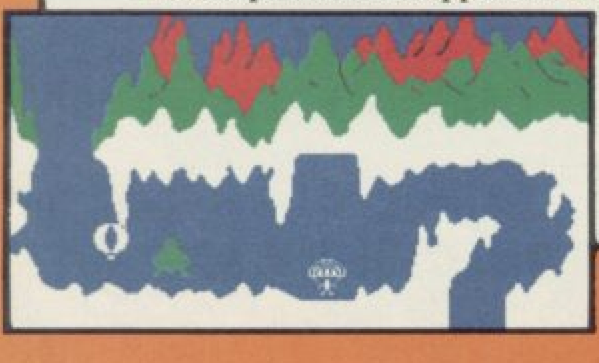
Colette McDermott

Publisher Datasoft **Memory** 48K
Price £7.95 **Joystick** Sinclair, Kempston, Cursor
★★★

Valley of the Dead

COULD the title refer to your mental state if you actually buy this game?

"Three explorers are trapped at the bottom of deep caves", reads the inlay card. "Armed with luck and a hot air balloon you must descend into the caverns to save them."



Set in a graphically sparse mountainous landscape, the game involves manoeuvring your balloon through the tunnel. Barring your way, through stage one, is a boring old alien and a parachute. Those must be avoided as well as the jagged edges of the cavern.

At the start of each new game you can select to play any one of the three levels of difficulty. Each level features an increased number of obstacles.

Okay, so the game is cheap. You might, nevertheless, be wiser to type in one of the listings in *Sinclair User*.

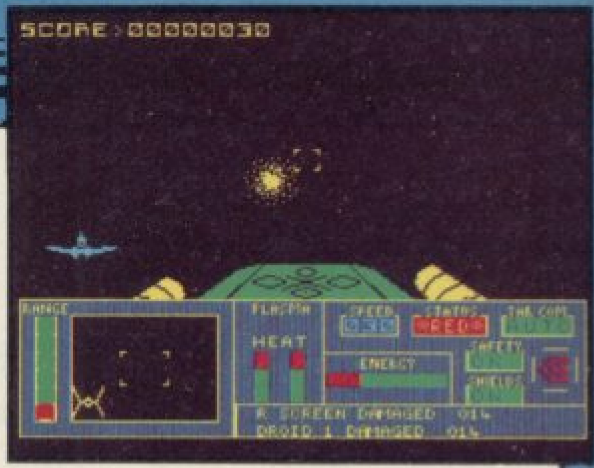
Central Solutions proudly announces on the inlay card that a C15 blank cassette is yours upon writing to them. Is that a form of compensation?

Colette McDermott

Publisher Central Solutions
Price £0.99 **Memory** 48K
★★

more software on page 34

Codename MAT II



THE MYONS are back again, after a year or so of inactivity, with **Codename MAT II**, another epic saga of alien-zapping from the mind of Derek Brewster.

This time it's a grid of satellites you are defending from the rotten galactic sprites, which power the Karillium mines of Vesta, without which substance millions will never . . . well, stuff the scenario. It's the zapping that counts.

The game has a terminal case of the beam-me-ups. Your spaceship has lots and lots of gadgets like ion engines, plasma guns, two scanners, and so on. All good solid stuff bought cheap off an old episode of *Star Trek*. They need a lot of keys to operate.

The screen shows the standard cockpit view, and an array of instruments. A smaller screen in the corner can be set to show the whole grid, or sector scans, or a detailed account of the status of your ship. Damage can be repaired by two droids which operate while you play.

Death comes when your shields are penetrated, or your lasers overheat, or something equally vile such as drifting about with no engines left. At the end of each wave — there are eight, repeated with more nasties for a total of 256 — you can repair satellites, your ship, or move satellites around to try and maintain the most efficient grid.

Despite its creaky concept, the game is mightily addictive. Later waves of aliens become both cunning and ferocious, spreading themselves thinly to attack as many satellites as they can, or grouping in force and homing in on you. Touches like that, plus damage reports and the need to make tactical decisions about the repair droids or where to warp to next, certainly increase the illusion of being a middle-aged actor with a spreading waist and an abiding love of ultra-rational Vulcans. *Chris Bourne*

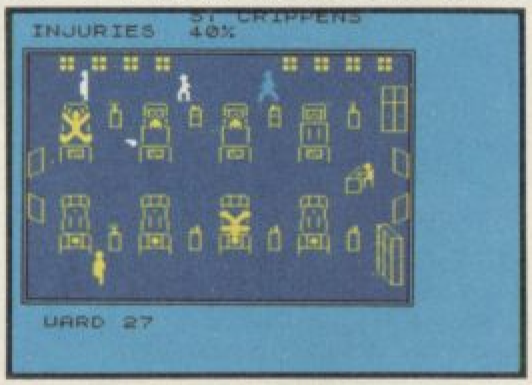
Publisher Domark **Price** £8.95
Memory 48K **Joystick** Sinclair, Kempston, cursor
★★★

St Crippens

HOSPITALS have never been popular places and with its boast, 'Worst hospital in the world,' St Crippens won't change that. Patients never recover and often disappear for ever.

Guiding your patient around you explore the rooms searching for clothes – essential to your escape. Hospital staff will pursue you. There are bedpans lying about the ward floors, mutants in the Genetic Engineering Department and mould on the kitchen floor. All must be avoided.

Detailed graphics are limited and barely adequate. There are patients strung up in beds wearing body plasters or playing darts in the games room; the matrons have buns in their hair. It is difficult to pick out your patient amongst the swarm after him, as all characters tend to look alike.



Controlling the patient is tiresome. He refuses to react immediately and often gets caught.

It is sold at the cheaper end of the market, but it could do with a shot in the arm or a medical examination before realease. *Colette McDermott*

Publisher Creative Sparks
Price £2.50 **Memory** 48K
Joystick Kempston, Sinclair
★★★

Bryan Robson's Super League

THE FIRST thing you'll notice about **Super League** is the price; £19.95 is steep for any game. This time it is a computer-moderated board game, and we suppose the price has something to do with all the bits of cardboard and money and dice.



What you do is manage a team, through a league season. The computer handles the league tables, random events, and fixes the gate money.

There are two stages. First you are shown the week's draw of matches on the computer. Teams travel from wherever they were last time around, and if a home team arrives at its own ground with a move in hand over its opponent, it gets to buy a player, which increases the points value of the team.

The second stage is the match. Again the dice are thrown and referred to a table which translates the score into points. After that, teams can play Match Cards – if they have them – to nobble the opposition.

It is a likeable game, not really very faithful to football and not really requiring a computer, most of whose functions could easily be carried out by the players. We tried hard to like it more, but there are some niggles. The instructions on the box lid are ambiguous in places, particularly regarding movement and in what order players should move.

Those flaws serve to irritate. For the price one expects everything to be done perfectly, and our rating reflects that. If you don't mind clarifying the rules yourself and have plenty of dough then you can get a lot of fun out of **Super League**. Perhaps that's why it was launched in Harrods. *Chris Bourne*

Publisher Paul Lamond **Price** £19.95
Memory 48K
★★

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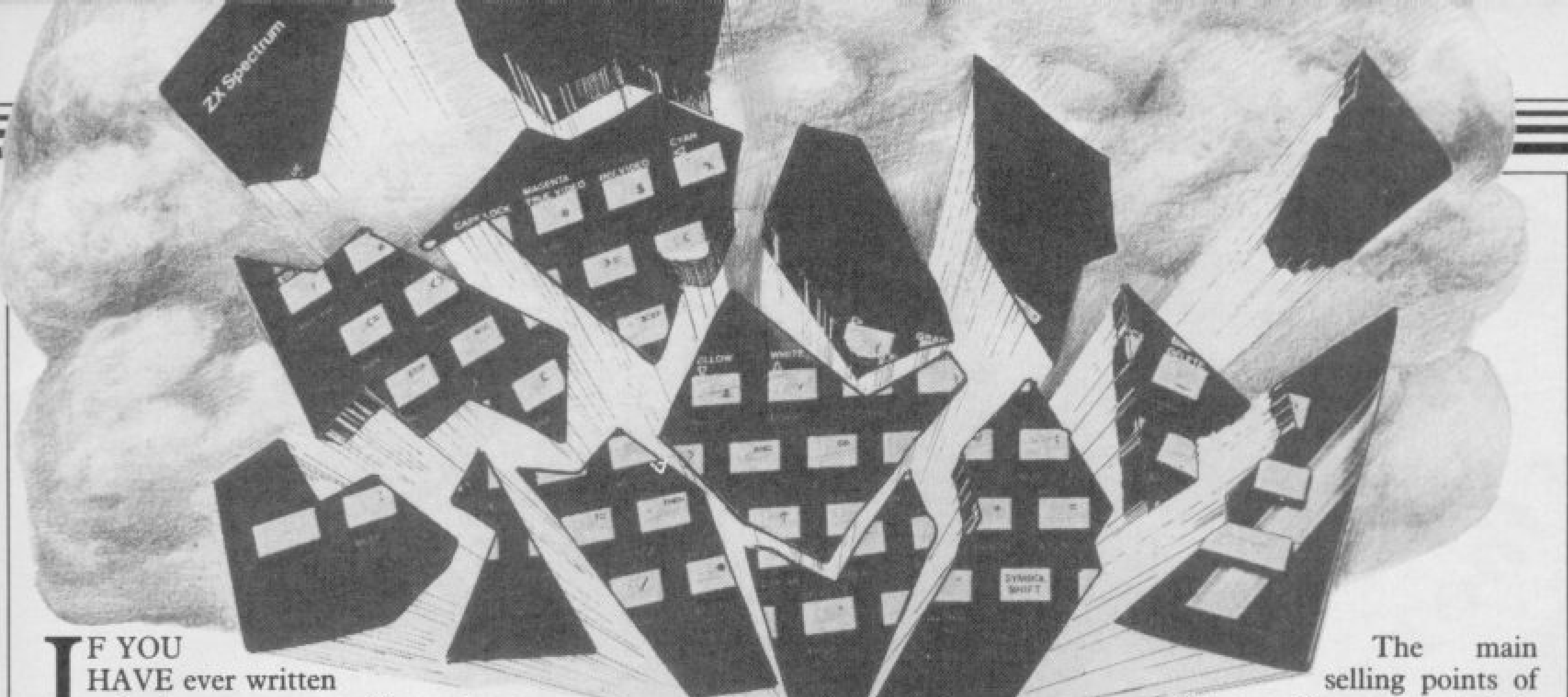


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CBM 64



Exploding into code

Marcus Jeffrey turns the heat on the Blast compiler

IF YOU HAVE ever written a Basic program, or if you have ever owned a Basic program, you can probably find a use for the **Blast** compiler.

When you run a Basic program it is interpreted by the Spectrum, one line at a time. The advantage of compiling the code is that the entire Basic program is converted into machine code before it is run, giving a much faster execution time.

Blast arrives on cassette with a 30-page user manual. You can also backup **Blast** onto microdrive. Now to speed up those sluggish programs, though you are not likely to be able to do a lot with less than 3K of memory available!

Unfortunately, in order to create such a sophisticated compiler, the programmers have used nearly all of the available memory. So, if you want to compile a program of any reasonable size, you will have to compile from tape-to-tape — or microdrive.

Compiling on the Spectrum can be very prolonged, especially using tapes. In that case, you first have to load in the toolkit and make a special copy of the program to be compiled onto tape. You then start compilation, and the computer constantly prompts you to change the tapes over.

The main selling points of **Blast** are its speed and Basic compatibility. We put it through its paces. Programs can be compiled into either pure machine code or the more compact 'p-code'. OCS claims a speed increase of up to a factor of 40. Try as we might we could not get even close to that, whatever instructions we included. Nevertheless, you can expect a minimum speed increase of between five and 10 times for most situations.

Blast is said to be able to compile all Basic programs. That includes those which call user-written machine code routines, and even those using Basic extensions.

We tried out a number of programs, and all but one worked correctly. We have still no idea why that one program posed problems. The assumption must be that **Blast** is pretty clever and will compile most, but not quite all, programs.

Blast was initially to have included a number of highly optimised Basic extensions, such as WHILE . . WEND, REPEAT . . UNTIL, IF . . THEN . . ELSE and multi-line recursive functions. Unfortunately due to space restrictions those were not included — a great loss. Instead, supposedly as compensation, Oxford Computer Systems has programmed a couple of extra — and in comparison useless — additions to the toolkit, included on the reverse of the cassette. These are shown in figure one.

Blast does have its drawbacks, but its flexibility for such a wide range of programming applications makes it a must for the serious programmer.

Marcus Jeffery

Figure 1. Toolkit Commands

★E n1	— Edit line n1.
★J n1	— Joins line n1 to the subsequent line.
★C n1,n2	— Copy line n1 to n2.
★C <range>,n	— Copy the range of lines to n onwards.
★D n1	— Delete line n1.
★D <range>	— Delete the line range.
★M n1 n2	— Move line n1 to n2.
★M <range>,n	— Move the range of lines to n onwards.
★R <range>,n1,n2	— Renumber the line range, starting at n1 with step n2.
★F <range>,string	— Find and string in the line range.
★S <range>,s1,s2	— Find and replace string s1 with s2 in the line range.
★G	— Turn on Global find and search.
★A	— Turn on Accept find and search (prompts user at each match).
★V	— Lists a number of useful system variables.
★L	— Lists all currently defined BASIC variables, including their values.
★T	— Start BASIC trace. <Space slows execution. <Enter> halts execution.
★U	— Stop BASIC trace.
★K	— Kill REM statements (other than the special command REMS).
★W <range>,<file>	— SAVE the range of lines to cassette.
★B <file>	— SAVE the current program to cassette in a form suitable for Blast compilation (tape-to-tape).
★Q	— Quit the toolkit.

Note: The toolkit requires approximately 2K of memory, and cannot be used at the same time as Blast.

Publisher Oxford Computer Systems, Hensington Road, Woodstock, Oxford OX7 1JR.
Tel: 0993 812700
Price £24.95
Memory 48K
★★★★★

QL Match Point

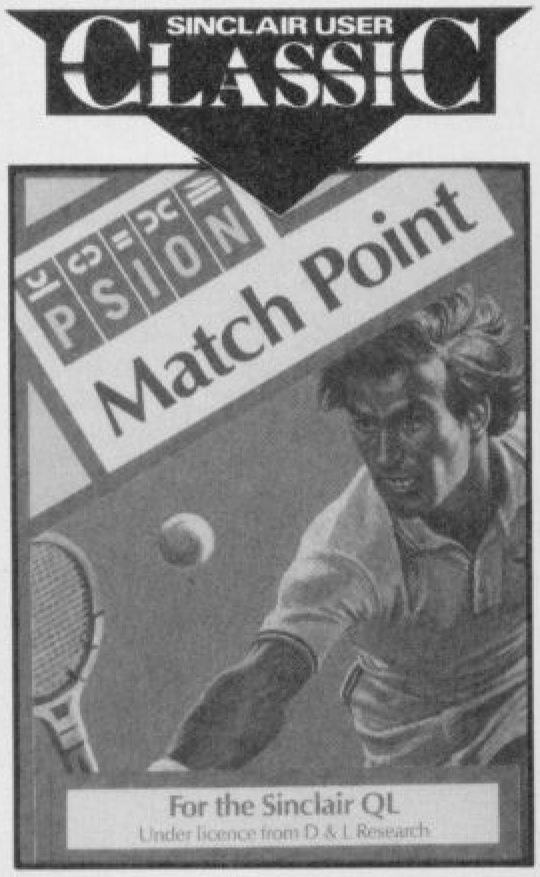
WIMBLEDON MAY be over, the players gone, and strawberries out of season, but **QL Match Point** from Psion should take you through the winter months.

The game is a conversion from the Spectrum but the authors have used the full power of the QL to make it faster, brighter, and a brilliant follow-up to **QL Chess**.

Centre Court at Wimbledon is shown in all its 3D glory. The crowds might not move their heads as rallies are played but the ball boys, line judges and umpire all move when necessary.

At the start of the game you can decide whether you want to play in the quarter finals, semi-finals or finals. The speed of the action increases as you move through the championship league table. You must also decide whether you want to play with a friend or do battle against the computer.

The computer generated player is almost infallible — even in quarter final matches — and has all the ability of Boris Becker. It can knock a ball across the court which, even at full run, you will not be able to return. As a beginner, I found it difficult to win one game against the computer, let alone a set.



A joystick is a necessity when playing the game. You have to use the cursor keys to move in four directions and the space bar to swing the racket. I was all fingers and thumbs. It is impossible to respond to the swiftness of the computer generated player using the keyboard.

Psion has another QL winner. The quality of the game is superb, and the authors have handled the limitations and sophistication of the machine's graphics with professional skill.

John Gilbert

Publisher Psion
Price £14.95
Joystick
★★★★★

SuperBasic Extensions

JOB CONTROL, memory management and file handling are just a few of the tasks which can be handled with Adam Denning's new EPROM cartridge.

Extensions to SuperBasic include commands to activate jobs, invoke QDOS traps, program the function keys and reset the machine, without pressing the usual button at the side of the QL.

The games player and graphics designer have not been left out either. High score tables can be set up using a routine which produces a table of results in memory and commands have been included which provide information about the screen and windows which are active on it. Denning has also implemented routines which will copy the screen to a device such as a microdrive or compatible printer.

Many of the extensions, however, are rather esoteric for a Basic programmer and of little use to a machine code programmer who would no doubt use an assembler and monitor anyway. Such commands include rotating 32-bit integers, setting logical operations and copying words to and from specific addresses.

The pros of the package, however, outweigh the cons, and if machine code programmers want to alter machine code from the SuperBasic environment then that is up to them.

For those who want an alternative to Tony Tebby's **QL Toolkit**, produced by Sinclair Research, Denning's extensions are ideal. The former utility has to be loaded in from microdrive, and that can take up to a minute. All you have to do with the extensions is to slot the supplied EPROM into the ROM socket and all the commands are available when the machine is powered up.

John Gilbert

Publisher Hi Soft
Price £34.95
★★★★

Expresso Coppee

ALTHOUGH MOST companies include a back-up routine for their particular programs, few general purpose utilities are available.

Expresso Coppee not only provides a back-up utility but also copies most files in under one minute. To put it to the test we made it copy itself. It comprised 123 microdrive sectors and took 47 seconds to complete the copy.

We also tried Expresso with **Abacus**. It was 198 sectors in length and the Psion copy routine took three minutes to do its work. Expresso did the job in 56 seconds.

If an error occurs during operation the utility can cope with it. The file will be read until the fault is located. The program has a retry option, which will try to copy a program a specified number of times.

Software houses need not fear that the utility will be a boon to pirates. **Expresso Coppee** will not operate on security protected files of any description. It will, however, read 99 per cent of other files.

The routine is overpriced at £9.00, when you consider that a similar utility is included in the Sinclair Research **QL Toolkit**, which offers much more and costs £25.00

John Gilbert

Publisher Total Computability, 45 Ewart Street, Brighton BN2 2UP
Price £9.00
★★★

more QL software on page 40

QL Monitor

IF YOU HAVE the **QL Assembler** from Sinclair Research you will find the **QL Monitor**, by Tony Tebby, a useful addition to your software library.

QL Monitor and the assembler are not compatible and cannot be run side by side, although they both use the same system of mnemonics.

The package provides disassembly, breakpoint setting and machine code trace facilities together with a simple line assembler. It is invoked with the command QMON at which point it will start running in the window at the bottom of the screen. You can make it run on any channel by adding the usual channel suffix to the basic command. As a result, it is possible to have several versions of the monitor running in different windows.

Disassembly is just a matter of typing the instruction D followed by the start and end addresses of a block of memory. The display format, shown when the command is invoked, is composed of a decimal representation of the instruction address, followed by the code for that instruction.

The Trace facility takes advantage of the trace flag within the 68008 processor. When the flag is set, each time an instruction is performed, QDOS calls **QL Monitor** and a check is made for errors.

There are two trace modes. The normal mode writes every instruction to the trace window as it is executed. The second mode is called Quick Trace. It monitors the program code in the same way as the first, but no record is made in the trace window of the instruction being executed.

Normally the trace facility is used to look at user application programs which operate in the QDOS User Mode. It can, however, be used to monitor the execution of privileged code in Supervisor Mode.

If an error occurs within a machine code program it is possible to make a correction to the code using the Modify instruction, which allows you to alter one instruction line at a time. As well as being able to modify the contents of RAM you can also change the values stored in the data and address registers. The Status Register, Program Counter and Stack Pointer can be altered in order to set up programs with test data.

The booklet which accompanies the package is above average for a Sinclair Research publication, even though it provides barely adequate descriptions of the monitor instruction set. However, it does show how to extend SuperBasic using machine code subroutines. As Sinclair Research seems to make a habit of not including examples in its utility manuals, the booklet is certainly a step forward.

If you are shopping around for a monitor to go with your assembler then **QL Monitor** is worth bearing in mind. Its power and flexibility in dealing with straightforward machine code or QDOS traps and jobs puts it above almost all other monitors and disassemblers on the market. The only product which comes close to it is the Hi-Soft **MON QL**. Both packages are remarkably similar in performance and display.

John Gilbert

Publisher Sinclair Research
Price £24.95
★★★★

Touch 'n' Go

TOUCH TYPING is a real bind on any Sinclair computer but Sinclair Research is trying to make the process easier with the release of **Touch 'n' Go**.

The package contains two programs. One is a tutorial covering all the basic keystrokes and the other is an analysis routine which calculates the results of the 62 lessons through which you, as a beginner, must progress.

Each lesson has a short introduction which gives the lowdown on the keystrokes you will encounter. You must press the ENTER key at the start and end of each line of the test. As you also need to keep your fingers on the central key positions you need at least six fingers on the right hand.

Each test sequence must be completed with 100 per cent accuracy and at a speed of 30 words per minute. If the boundaries of time or accuracy are exceeded you must repeat the exercise.

The program marks the tests with question and exclamation marks. Question marks mean you have made a keying error while exclamation marks show the parts of a test you have not completed. The more marks displayed on a test screen, the less accurate you have been.

Having completed the simple finger exercises you can move onto the real tests of skill and accuracy, typing in sentences and paragraphs. However, if you have learned your lessons well and are a reasonably fast typist, the speed at which the screen displays your input will soon fall behind the keying in of the tests. As a result, mistakes may not be picked up until it is too late and you will have to re-key the whole exercise.

The results analysis program, which is updated while you do the exercises, is confusing. Each entry shows the Achieved Accuracy, and Achieved Speed against Required Accuracy and Required Speed. Those headings are shown at the top of the screen as initials, such RA and RS. Viewed with the massive block of results data, the initials make the display seem even more confusing.

On other micros **Touch 'n' Go** may be a boon to budding secretaries, but on the QL it is little more than a toy. Although the package multi-tasks during the tests, the inability of the QL display to keep up with input makes an ordinary typewriter a better proposition for speed tests. Having said that, the package offers a viable alternative — though not a replacement — to typewriter tutorials.



John Gilbert

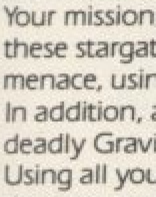
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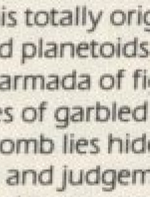
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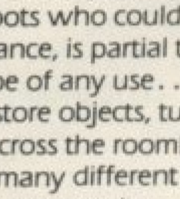
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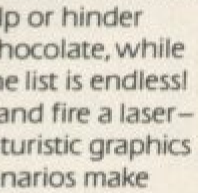
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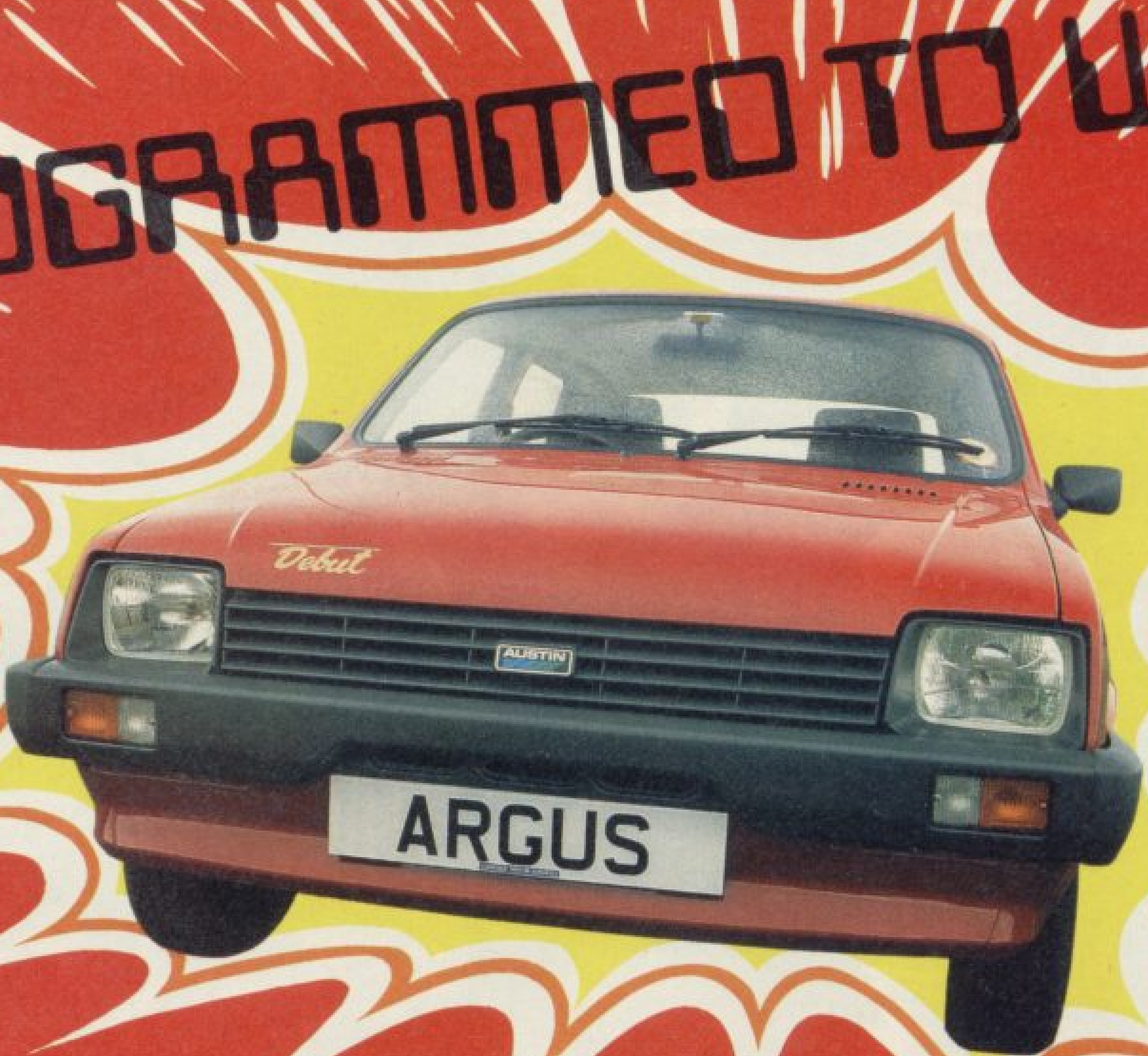
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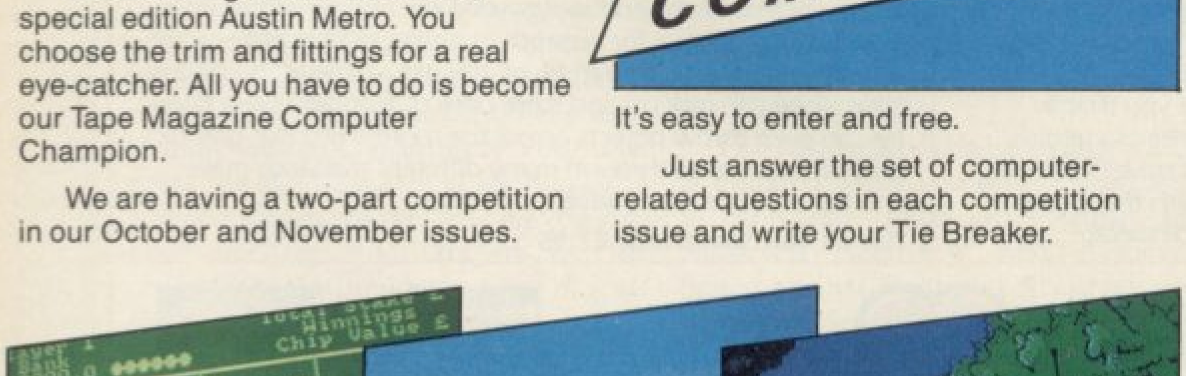
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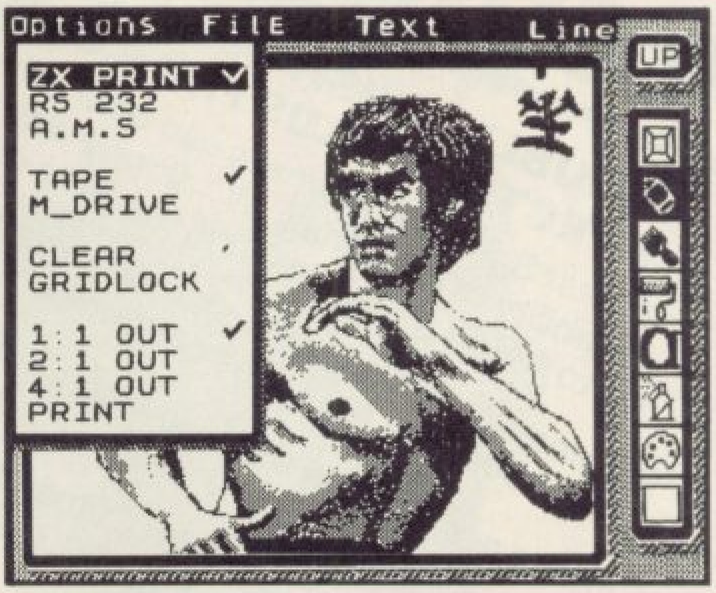
Finalist for Peripheral of the Year 1985. . . that's how successful the AMX MOUSE has been! A tried and tested product that now makes the keyboard positively old-fashioned. And offers a whole NEW approach to working with computers. Now this advanced opto-mechanical device can be used with YOUR SPECTRUM 48K MICRO!

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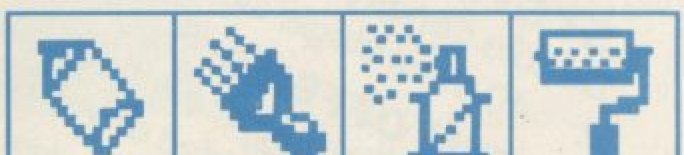
AMX COLOUR PALETTE lets you fill in with colour any pictures you've made with AMX ART. Now you can bring your drawings to life with rich, vibrant colours – and with a palette of 8 foreground + 8 background colours, to create full colour professional screen $, you certainly won't be short of inspiration!

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Keyboard for the Elite

FEW KEYBOARDS have impressed me as much as the new Saga 3 Elite, from Hardware International. It transforms the humble Spectrum into an expensive-looking micro.

Looks, of course, are only skin deep, but the Elite offers a staggering 88 keys, of which 27 are single key functions.

A perennial problem with add-on keyboards is the need to cram all possible combinations of modes onto the key caps. The Elite sidesteps that by printing only the letter, and having a plastic card, angled for better viewing, at the top of the keyboard.

That means that if you are new to the Spectrum you will still have difficulty locating the correct key, although the three-colour card means that this is no more difficult than using the old rubber Spectrum.

Where the keyboard comes into its own is when using programs such as **Tasword Two** or **Beta Basic.** With **Tasword** you do not use any keywords and the single key functions could have been designed for it; with **Beta Basic,** where it is possible to type in keywords in full, the lack of clutter makes life much easier.

Every silver lining has a cloud and with Elite the size of the keyboard means that if you have an Interface 1 you will find that the lead to the microdrive is not long enough. The microdrive can either be angled out at the back to compensate, or Hardware International can supply a longer lead.

With many full-sized keyboards users have encountered problems when adding hardware to the back. That has been eased with the advent of the Spectrum Plus, as it too suffered problems, and manufacturers redesigned their cases accordingly. The Elite seems to be better than most in that respect and an old style, upright, Kempston E printer interface can be fitted easily.

The keyboard is arranged as two banks of keys. On the left are 10 keys: True and Inv, Video — single key functions — plus Load, Save, Clear, Copy, Cont, Pause, List and Run. Those are not single key functions, merely j, s, x, z, c, m, d, and r keys for ease of use.

The main body of keys, the remaining 78, are in one large block. To the left of the QWERTY section are Edit, G Mode, Caps Lock, E Mode and Symbol and Caps Shifts — which are duplicated on the right. The top row has both the numbers and the Symbol Shifted legends printed on them.

To the right are another eleven single key functions (?£"=;:$,.) plus Break (Caps Shift Space) and Stop (Symbol Shift A). On the far right is a numeric pad, with a double-sized zero key, surrounded by the four maths functions (/*−+), four shifted cursor keys, an extra comma and full stop and a Delete key.

All those keys and functions are not without price — £79.95 inc. That is very high for an add-on keyboard. Only the new Transform keyboard comes close to matching it in terms of performance, and that costs as much.

With the Saga 3 Elite, Hardware International is also launching the Saga 2 Profile. That is the discontinued AMS Lo»Profile keyboard in a new colour scheme. Just before AMS stopped manufacturing, it redesigned the back of the keyboard to resemble the rear of the old rubber Spectrum to make fitting add-ons easier. The base was changed to solid, as opposed to flimsy plastic, and the position of the Spectrum inside the keyboard was moved so that Interface 1 users could put the microdrive alongside. Those improvements are included in the Saga 2. Hardware International has retained the old price, £49.95 inc.

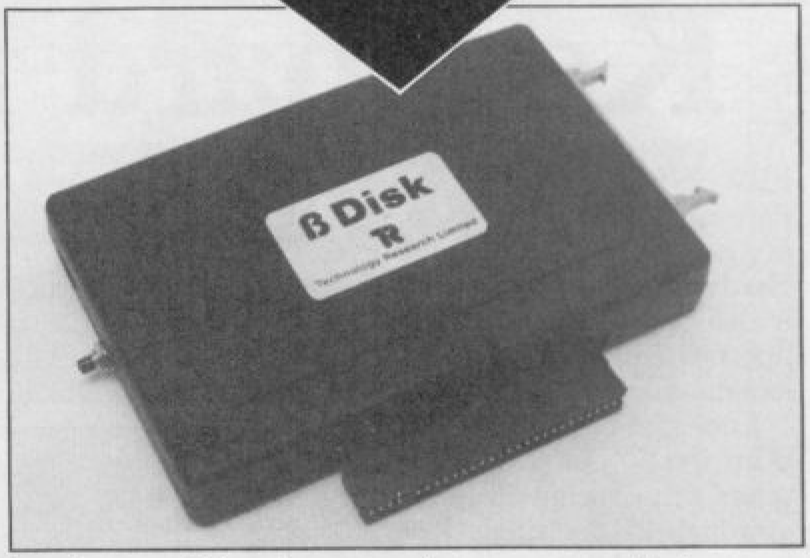
It has 53 keys, 41 in the main block with a full-sized space bar and an extra, unshifted, key marked Caps Shift. On the right is a numeric pad with an extra Caps Shift key and one, unshifted, marked with a full stop.

Hardware International, 2 Eve Road, Woking, Surrey GU21 4JT. Tel: 04862-22977

more hardware on page 46



Much Beta



TECHNOLOGY Research has upgraded its Beta disc interface for the Spectrum, and it is now probably the best stand-alone disc interface for that micro. TR has put all the commands in ROM, added sequential and random access files, provided auto-boot and made it possible to transfer any program to disc.

The new Beta, called Beta Plus, uses a system similar to the Mirage Microdriver. A tape-based program is loaded as normal and then at any point a 'Magic Button' on the interface can be pressed, which transfers the entire 48K to disc. When that is loaded back, the program continues from the point at which it was saved.

The system has some limitations in that it always saves that file under the same name in the same place on the disc, but once saved the file can be renamed and moved around. Unlike the Microdriver, which sometimes has problems fitting two programs on a cartridge, the increased capacity of a disc, 156K with a 40-track drive and up to 636K for an 80-track, double-sided drive, means that you can transfer your entire library to disc.

As well as the 'Magic Button', the Plus now has a reset button. When that is pressed, and on power up, the interface looks for a Basic program, 'boot', on drive one — up to four drives can be used. It also checks to see what sort of drive is connected, 40 or 80-track, single or double-sided, and the stepping rate. When another drive is used that check is made again so you can mix different types of drives.

In addition to the existing commands, LOAD and SAVE of Basic, Code and Data, MERGE, CAT, ERASE, NEW (Rename), MOVE (Compact), and PEEK and POKE (sector read/write), the ROM has been changed so that the Break key can interrupt an operation. The Password is no longer required — old discs can still be read — and FORMAT and COPY are included, plus the new filing commands.

The main additions are the sequential and random access files. A sequential file is opened using the usual OPEN # command, followed by the file name and then either a W, for write or an R for read. Information can by PRINTed to and INPUT from the file.

A random access file is opened in a similar way except that the file name is followed by the keyword RND and a number denoting the record length, up to 254 bytes. Records can be PRINTed to and INPUT from the file at any position.

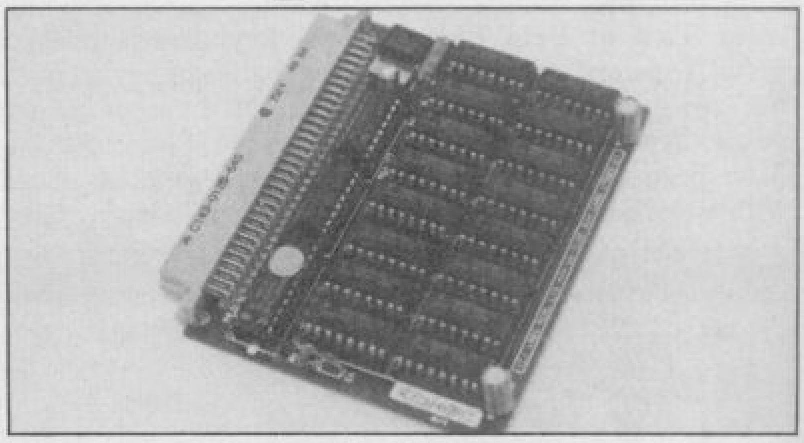
Technology Research still includes a disc with the interface including a number of utility programs. Those include an enhanced CAT which gives details of file size and start address, FORMAT for old style drives, and a rudimentary tape to disc copier which copies all normally saved files, including Data, to disc.

For a stand-alone interface — one to which you can add your own drives — it is well priced at £109.25 including VAT, plus £2.00 p&p. Existing owners of the Beta can upgrade for £19.95 plus £4.00 p&p.

With the 'Magic Button', Technology Research deserves to have a winner with the Beta Plus; it could be the start of a new era.

Technology Research Ltd, Unit 18, Central Trading Estate, Staines, Middlesex TW18 4XE. Tel. Staines 63547.

New ROM leaps onboard



WHEN I first reviewed the PCML 512K RAM expansion card for the QL, I commented that it might degrade the display on some QLs.

PCML has now redesigned it to work perfectly, with no noise and a crystal-clear display. The price is still £310.50.

PCML has also just released its 256K RAM board with an onboard ROM. The ROM contains extras from the Tony Tebby **Toolkit** plus commands for RAM discs and to spool a file. Up to eight RAM discs can be used, with the names RAM10, RAM20 and so on, and each can use all the available memory. In addition there is the command RAM_USE, as in 'RAM_USE mdv' enabling any command using MDV to automatically use the RAM disc as a default.

The spool commands SPL and SPL_USE operate as a multitasking job. SPL_USE sets up the default destination device for SPL which is used to send the file. For example 'SPL_USE ser1:SPL file_name' would send the file 'file_name' to the serial port. The command DATA_USE is used to set the default source file; so 'DATA_USE mdv1_test:SPL_USE ser1: SPL file1' would send the file 'mdv1_test_file1' to the serial port.

From the **Toolkit** there is the JOBS set of commands which control multitasking jobs from SuperBasic.

The 256K RAM/ROM board is priced at a reasonable £195.50.

PCML Ltd, Royal Mills, Esher, Surrey KT10 8AS. Tel: 0372-67282/68631

more hardware on page 48

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Rise of the Bright Star

THE LONG AWAITED Commpak Data modem, Bright Star, marketed by Modem House, is available for the QL. Initially just the standard modem, at £179.95, will be available. Plans are, however, underway for an auto-dial/auto-answer model which, it is rumoured, will cost little more than £200.

Like the recently launched — re-launched? — QL-Connect the Bright Star is software driven — no switches to play with on the front of the box — which means that you have complete control from the keyboard. As a by-product of that freedom of control the modem is not computer dependent. If you have the right software you can use the modem on any computer with a serial port.

The modem is the usual black box, with LEDs on the front to show what is happening, and a collection of sockets on the back. Your 'phone plugs into one of those sockets which then goes back to the wall socket — when the modem is not in use you can still use the 'phone. Another lead plugs into the mains, and is supplied with a moulded, fused, plug. Of the two other sockets, one connects to the SER2 port on the QL — using the standard Sinclair cable — and the other is a parallel output to a Centronics printer.

As to the software supplied with the modem, I do not claim to be any great shakes in the Comms department but it looks good. If I can use it any idiot can.

There are two main areas of software, Prestel and Terminal Emulation. The Prestel software gives you access to systems such as Prestel and Micronet, while the terminal software allows you to access everything else.

When Prestel is up and running the QL looks just like any other computer — apart from the appearance of a useful clock which shows how long you have been on the 'phone. There are facilities to dump a screen to a drive or the printer — which were temperamental on the preliminary software I was using — send Prestel codes or refresh the screen. The modem had problems with some of the really fancy graphics produced by Micronet. The people of Commpak, to their credit, told me about that when they gave me the modem and that they are working on it.

The modem comes into its own when running the Terminal software. You can preset it to the Baud rate used by the Bulletin Board, or set it to auto-scan and let it do the work for you. Auto-scan hiccuped a few times when the Bulletin Board was also trying to do it but if that occurs all you have to do is set a rate.

One feature I found useful was the ability to send the incoming information and my replies to a file as well as to the screen. If you have a disc drive connected you can save information and review it at your leisure.

The 1200/1200 rate is a special packet system for user to user — QL to QL — communications. It includes, and I quote — "carrier sense collision". I do not know what it does either but acquaintances who are into modems tend to get excited at the mention of the term.

The Bright Star potentially has the edge over the other QL modems in terms of cost, once it gets its software straightened out. Admittedly I was using an early version but it should be finalised by the time you read this article. It has some good features, particularly the auto-scan. The ability to use the modem on other computers will bring it many buyers.

Modem House Ltd, Iolanthe Drive, Exeter, Devon. EX4 9EA. Tel: 0392-69295.

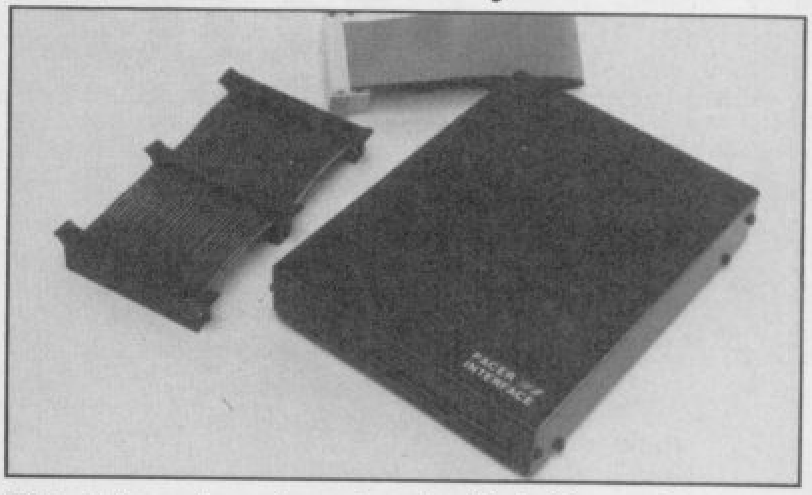
Pacer inspires déjà vu

THE NEW PACER disc interface from Omnitronix for the Spectrum evokes strange feelings of *déjà vu*. It is instantly recognisable by users of the Primordial Peripherals and Statacom systems.

The Pacer, and Omnitronix would be the first to admit it, is a budget interface for the Spectrum, and at only £79.95 for the interface plus £2.50 p&p, or £119.95 plus £5.00 p&p for the interface and a 100K drive, it fits the bill admirably. It is simple in operation but it can LOAD and SAVE Basic, Code and Data, which is all many people would want to do.

Omnitronix has redesigned the printed circuit board so it should be a little more reliable than the two previous systems. The system currently only works on 40 track, single-sided drives.

The interface is housed in a metal case which connects to the Spectrum via a flexible three-way connector.



The drive plugs into the back of the interface with a choice of either a Shugart or a BBC-style connector.

When the system is powered up, or the reset button pressed, the operating system is copied into the top 8K of the Spectrum memory. That means few commercial programs can be used with the system without major reorganisation.

The system is relatively easy to use; the variable f$ is used to hold the file name plus any parameters and then a RAND USR call is made using a variable, such as 'b1' for Basic Load, 'bs' for Basic Save and so on.

As much as 107.25K can be stored on a disc with up to 39 different files. The interface treats each track as a sector — of 2816 bytes — so even if you save only one byte you lose the other 2815.

A file is automatically verified when it is saved and when a Basic program is saved the user defined graphics are saved with it.

The Pacer is not outstanding as a disc interface, but it is a good introduction to the world of disc storage.

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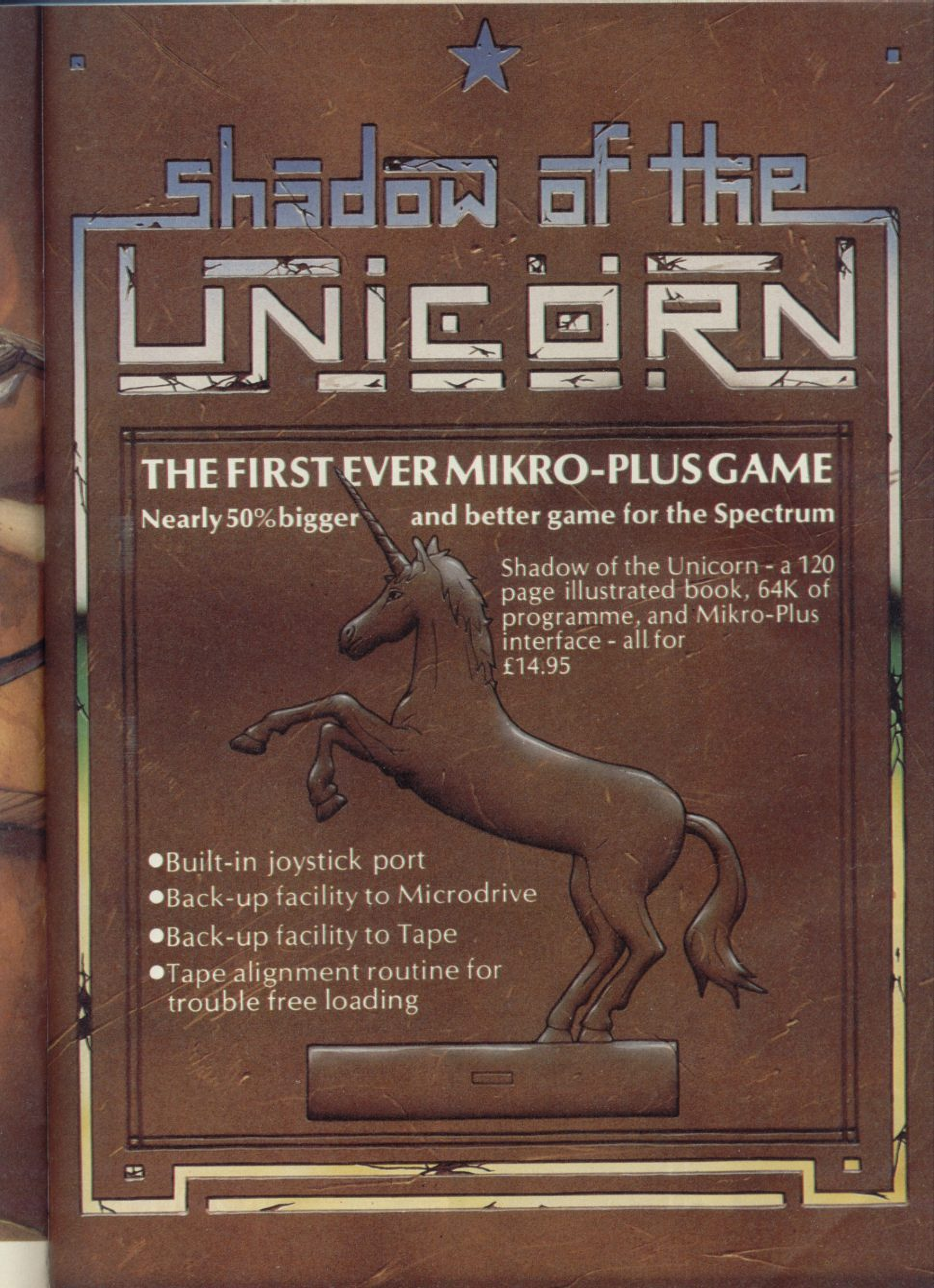
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Adding up bit by bit

Marcus Jeffery waves his binary wand and before you can say 'RST 28H' you have got a screen magnification utility

THIS MONTH we are going to look at the more advanced arithmetic instructions available on the Z80, and employ them in a screen magnify and reduce utility. You could easily add this routine to the alternate screen and fill utilities from the last two months.

We have already seen how to add and subtract bytes, using the ADD and SUB instructions. If we want to add 16-bit numbers together, we have looked at the 'ADD HL,rp' instruction which will add a 16-bit register pair to the HL register pair.

What happens, however, if we want to add two 16-bit numbers without using the HL register pair, or even add 24-bit and 32-bit numbers together? Z80 handles that in much the same way as we perform calculations. Imagine that you were performing the following addition:

```
   987
 + 456
 -----
  1443
 -----
```

You first add the seven and six, giving 13, and then consider that as the digit three with a carry of one. That is then added to the eight and five, giving four with a carry of one, and so on.

We can do exactly the same thing when adding binary numbers together. The ADD instruction will correctly add the two bytes. If the addition of the two most significant bits gives a carry — that can only be zero or one — then the carry bit in the Flag register is set.

If we convert the above calculation to binary we would get the following:

```
  987 = 0000 0011 and 1101 1011
+ 456 = 0000 0001 and 1100 1000
```

continued on page 54

Figure 1.

```
next  LD    A,(DE)   : get byte from first number
      ADC   A,(HL)   : add (with carry) byte from second number
      LD    (HL),A   : place result in second number position
      INC   DE       : move to next byte of first number
      INC   HL       : move to next byte of second number
      DJNZ  next     : continue until addition complete
```

Figure 2.

```
         LD     D,0        : Make multiplicand 16-bits
         LD     HL,0       : Set result to zero
         LD     B,8        : Perform 8-bit multiplication
nextbit  ADD    HL,HL      : We use this to shift HL one bit left
         RLA               : Shift multiplier one bit left into the carry flag
         JR     NC,noadd   : If no carry, then no addition, else
         ADD    HL,DE      : add the multiplicand
noadd    DJNZ   nextbit    : Do remaining bits
```

Figure 3. RST 28H instruction

Operand	Operation	Description
00h	Jump-True	Conditional jump based on value at top of stack
01h	Exchange	Swap the two values at the top of the stack
02h	Delete	Delete the value at the top of the stack
03h	Subtract	Delete two top values and stack subtraction result
04h	Multiply	Delete two top values and stack mulitplication result
05h	Division	Delete two top values and stack division result
06h	Power	Delete two top values and stack power result
07h	X-or-Y	Gives X if Y = 0 and one otherwise
08h	X-and-Y	Gives X if Y < > 0 and one otherwise
09h	X < = Y	Gives true if X < = Y else false
0Ah	X > = Y	Gives true if X > = Y else false
0Bh	X < > Y	Gives true if X < > Y else false
0Ch	X > Y	Gives true if X > Y else false
0Dh	X < Y	Gives true if X < Y else false
0Eh	X = Y	Gives true if X = Y else false
0Fh	Addition	Delete two top values and stack addition result
10h	X$ and Y	Gives X$ if Y = 0 and "" otherwise
11h	X$ < = Y$	Gives true if X$ < = Y$ else false
12h	X$ > = Y$	Gives true if X$ > = Y$ else false
13h	X$ < > Y$	Gives true if X$ < > Y$ else false
14h	X$ > Y$	Gives true if X$ > Y$ else false
15h	X$ < Y$	Gives true if X$ < Y$ else false
16h	X$ = Y$	Gives true if X$ = Y$ else false
17h	X$ + Y$	Concatenate X$ and Y$
18h	Value$	Replace top of stack with VAL$ of item
19h	Usr$	Replace top of stack with USR of string item
1Ah	Read-in	Read (INKEY$) from a channel
1Bh	Negate	Negate the value at the tip of the stack
1Ch	Code	Replace top of stack with CODE of string
1Dh	Value	Replace top of stack with VAL of string
1Eh	Length	Replace top of stack with LEN of string
1Fh	Sine	Replace top of stack with SIN of value
20h	Cosine	Replace top of stack with COS of value
21h	Tangent	Replace top of stack with TAN of value
22h	Arcsine	Replace top of stack with ASN of value
23h	Arccosine	Replace top of stack with ACS of value
24h	Arctangnt	Replace top of stack with ATN of value
25h	Logarithm	Replace top of stack with LN of value
26h	Exponent	Replace top of stack with EXP of value
27h	Integer	Replace top of stack with INT of value
28h	Sq-root	Replace top of stack with SQR of value
29h	Sign	Replace top of stack with SGN of value
2Ah	Absolute	Replace top of stack with ABS of value
2Bh	Peek	Replace top of stack by PEEKing value
2Ch	In-port	Replace top of stack with IN value
2Dh	Usr	Replace top of stack with USR of value
2Eh	String$	Replace top of stack with STR$ of value
2Fh	Char$	Replace top of stack with CHR$ of value
30h	Not	Gives one if top of stack is zero and zero otherwise
31h	Duplicate	Make duplicate of top of stack at top of stack
32h	X mod Y	Replace two top values with INT(X/Y) and remainder
33h	Jump	Unconditional jump based on top of stack
34h	Stk-data	Stack list of literals following '34h' code
35h	Dec-jr-nz	Perform DJNZ on BREG system variable
36h	X < 0	Gives true if top of stack < 0 else false
37h	X > 0	Gives true if top of stack > 0 else false
38h	End-calc	End the RST 28H calculations
39h	Get-oper	This routine converts a function operand to a value
3Ah	Truncate	Replace top of stack with truncation (towards zero)
3Bh	Sgle-Calc	Perform single calculation (Code in B)
3Ch	E-convert	Convert a number in the form 'numEm' to top of stack
3Dh	Restack	Restack number
3Eh	Series	Series generator for SIN, COS, LN, etc.
3Fh	Stk-lit	Stack a literal zero, one, half, half-Pi or ten
40h	Store-mem	Store in memory 0 to 5 (codes C0h to C5h)
41h	Get-mem	Get a memory 0 to 5 (codes E0h to E5h)

continued from page 53

We can now do that by ADDing the lowest two bytes to give:

(1) 1010 0011

and then ADC the top two bytes to give:

(0) 0000 0101

If we convert that to decimal, we get 256 ★ 5 + 163 = 1443.

Using that method, we could effectively add any number of bytes together. Suppose that we had two numbers, each being made up of a large number of bytes. We could hold the number of bytes in B, the location of the lowest byte of the first number in DE and the location of the first byte of the second number in HL. We could place the result into the locations presently used for the second number — HL onwards. The code would look something like figure one.

With this sort of routine you must ensure that you do not corrupt the carry flag between one ADC instruction and the next. We have made a couple of assumptions with this routine. Firstly, we would be in a mess if the carry flag was set before entering the routine, and would add an extra digit to the lowest byte.

An easy method of clearing the carry flag is to perform an ADD instruction which could not possibly set it; 'ADD A,O' — Add zero to the accumulator — works well.

The other assumption is that the most significant digits are higher in memory. We can compensate for that by changing the INC instructions to DEC, neither of which affect the carry flag. Figure seven shows all the ADC instructions, together with their equivalent SBC — SuBtract with Carry — instructions.

We have seen how to multiply a number by two, either by adding it to itself, or by shifting one bit to the left. Division by two is similarly performed by shifting one bit to the right.

A more general multiplication algorithm can be performed as a series of additions, in the same way as you would do long multiplication by hand. Imagine the calculation:

```
   19
 × 34
 ----
   76
 +57
 ----
  646
 ----
```

Figure 4.

```
                       ORG     60000
                       LOAD    60000

EA60 CDA5EA            CALL    COPY1          ;Copy to alternate screen
EA63 2143EB            LD      HL,XCOORD      ;Get X-multiple and place
EA66 CD7EEA            CALL    DIVIDE         ;    into (DX)
EA69 ED434BEB          LD      (DX),BC
EA6D 2147EB            LD      HL,YCOORD      ;Get Y-multiple and place
EA70 CD7EEA            CALL    DIVIDE         ;    into (DY)
EA73 ED434DEB          LD      (DY),BC
EA77 CDBEEA            CALL    MAG            ;Perform magnify/reduce
EA7A CDB2EA            CALL    COPY2          ;Copy back to main screen
EA7D C9                RET                    ;Exit to BASIC

EA7E 46         DIVIDE LD      B,(HL)         ;B = x1
EA7F 23                INC     HL
EA80 7E                LD      A,(HL)         ;A = x2
EA81 90                SUB     B              ;A = x2 - x1
EA82 47                LD      B,A            ;Transfer A to 16-bit BC
EA83 0E00              LD      C,0
EA85 E5                PUSH    HL
EA86 CD2B2D            CALL    2D2BH          ;Stack BC
EA89 0601              LD      B,1
EA8B 0E00              LD      C,0
EA8D CD2B2D            CALL    2D2BH          ;Stack '1'
EA90 EF                RST     28H            ;Calculation...
EA91 0F                DB      0FH            ;    Addition
EA92 38                DB      38H            ;    End calculation
EA93 E1                POP     HL
EA94 23                INC     HL
EA95 46                LD      B,(HL)         ;B = x3
EA96 23                INC     HL
EA97 7E                LD      A,(HL)         ;A = x4
EA98 90                SUB     B              ;A = x3 - x4
EA99 CD282D            CALL    2D28H          ;Stack A
EA9C EF                RST     28H            ;Calculation...
EA9D A1                DB      00A1H          ;    Stack '1'
EA9E 0F                DB      0FH            ;    Addition
EA9F 05                DB      05H            ;    Division
EAA0 38                DB      38H            ;    End calculation
EAA1 CDA22D            CALL    2DA2H          ;Unstack to BC (C=frac)
EAA4 C9                RET

EAA5 210040     COPY1  LD      HL,16384       ;Copy main screen to
EAA8 ED5BB05C          LD      DE,(23728)     ;    reserve screen
EAAC 010018            LD      BC,6144
EAAF EDB0              LDIR
EAB1 C9                RET

EAB2 2AB05C     COPY2  LD      HL,(23728)     ;Copy reserve screen
EAB5 110040            LD      DE,16384       ;    to main screen
EAB8 010018            LD      BC,6144
EABB EDB0              LDIR
EABD C9                RET

EABE DD2143EB   MAG    LD      IX,XCOORD      ;IX = start of coords
EAC2 DD5600            LD      D,(IX+0)       ;D = x1 (xa)
EAC5 1E00              LD      E,0            ;E = frac inc to x1
EAC7 DD6E02            LD      L,(IX+2)       ;L = x3 (xb)
EACA DD4604     XLOOP  LD      B,(IX+4)       ;B = y1 (ya)
EACD 0E00              LD      C,0            ;C = frac inc to y1
EACF DD6606            LD      H,(IX+6)       ;H = y3 (yb)
EAD2 E5         YLOOP  PUSH    HL
EAD3 D5                PUSH    DE
EAD4 C5                PUSH    BC
EAD5 4A                LD      C,D
EAD6 110040            LD      DE,16384       ;Get screen coords for
EAD9 E5                PUSH    HL             ;    location (xa,ya)
EADA CD13EB            CALL    FCOORD         ;    on main screen
EADD C1                POP     BC
EADE ED5BB05C          LD      DE,(23728)
EAE2 A6                AND     (HL)
EAE3 2807              JR      Z,RESET        ;Jump to reset pixel
EAE5 CD13EB            CALL    FCOORD         ;Set screen coords for
EAE8 B6                OR      (HL)           ;    location (xb,yb)
EAE9 77                LD      (HL),A         ;    on reserve screen
EAEA 1806              JR      NEXT
EAEC CD13EB     RESET  CALL    FCOORD         ;Reset screen coords for
EAEF 2F                CPL                    ;    location (xb,yb)
EAF0 A6                AND     (HL)           ;    on reserve screen
EAF1 77                LD      (HL),A
EAF2 C1         NEXT   POP     BC
EAF3 2A4DEB            LD      HL,(DY)        ;Increment ya by DY
EAF6 09                ADD     HL,BC
EAF7 44                LD      B,H
EAF8 4D                LD      C,L
EAF9 D1                POP     DE
EAFA E1                POP     HL
EAFB 24                INC     H              ;Increment yb by one
EAFC DD7E07            LD      A,(IX+7)
EAFF 94                SUB     H
EB00 30D0              JR      NC,YLOOP       ;Loop along y-axis
EB02 E5                PUSH    HL
EB03 2A4BEB            LD      HL,(DX)        ;Increment xa by DX
EB06 19                ADD     HL,DE
EB07 54                LD      D,H
EB08 5D                LD      E,L
EB09 E1                POP     HL             ;Increment xb by one
EB0A 2C                INC     L              ;RETurn if x-axis wraps
EB0B C8                RET     Z
EB0C DD7E03            LD      A,(IX+3)
EB0F 95                SUB     L
EB10 30B8              JR      NC,XLOOP       ;Loop along x-axis
EB12 C9                RET

EB13 D5         FCOORD PUSH    DE             ;Variation on previous
EB14 79                LD      A,C            ;    PBYTE routine.
EB15 E607              AND     7              ;    Returns HL screen
EB17 5F                LD      E,A            ;    location and A bit.
EB18 CB39              SRL     C              ;    for coords (C,B)
EB1A CB39              SRL     C              ;    on screen starting
EB1C CB39              SRL     C              ;    at location DE.
EB1E 3EAF              LD      A,175
EB20 90                SUB     B
EB21 47                LD      B,A
EB22 E638              AND     56
EB24 CB27              SLA     A
EB26 CB27              SLA     A
EB28 B1                OR      C
```

Figure 4 cont.

```
EB29 6F                     LD     L,A
EB2A 78                     LD     A,B
EB2B E607                   AND    7
EB2D 67                     LD     H,A
EB2E 78                     LD     A,B
EB2F E6C0                   AND    192
EB31 CB3F                   SRL    A
EB33 CB3F                   SRL    A
EB35 CB3F                   SRL    A
EB37 84                     ADD    A,H
EB38 67                     LD     H,A
EB39 43                     LD     B,E
EB3A 04                     INC    B
EB3B AF                     XOR    A
EB3C 37                     SCF
EB3D 1F            FLOOP    RRA
EB3E 10FD                   DJNZ   FLOOP
EB40 D1                     POP    DE
EB41 19                     ADD    HL,DE
EB42 C9                     RET

EB43 01020304      XCOORD   DB     1,2,3,4           ;x1,x2,x3,x4
EB47 01020304      YCOORD   DB     1,2,3,4           ;y1,y2,y3,y4
EB4B 0000          DX       DB     0,0               ;DX = frac,int
EB4D 0000          DY       DB     0,0               ;DY = frac,int

                            END

Workarea - ACEA to AEA7
ORG  end - EB4F
LOAD end - EB4F
```

You first multiply 19 by four to give 76. Moving to the next digit, you multilply 19 by three, placing the result, 57, one digit to the left. Adding those gives the final result of 646.

The same calculation is even easier in binary. At each stage, the digit in the multiplier (34) will be either zero or one, so we just add either zero or the multiplicand (19) respectively, remembering to shift the final product one bit left after each step in the calculation. So, in binary, that would look like:

```
          00010011  (19)
 ×        00100010  (34)
 ------------------
 +        00000000  [0]
 +       00010011   [1]
 +      00000000    [0]
 +     00000000     [0]
 +    00000000      [0]
 +   00010011       [1]
 +  00000000        [0]
 + 00000000         [0]
 ------------------
  000001010000110  (646)
```

If you look at the digits in square brackets, you will see that, read from bottom to top, they exactly match the multiplier. Using that technique, we can develop a simple multiplication algorithm. That will multiply two eight-bit numbers into a 16-bit result. Assume that the E register contains the multiplicand and the A register contains the multiplier. We can then use the code in figure two to return the result in the HL register pair. Division is performed in a similar way, by a series of subtractions, just as you would perform long division.

You should be warned to avoid multiplication and division in programs wherever possible. Fortunately, few machine code programmers will ever find a need for such complex calculations. After all, how often are we going to need multiplication and division algorithms for moving space invaders around at fantastic speed?!

If you do need to perform more complex calculations, Spectrum programmers have an extra advantage. Have you ever wondered how Basic can evaluate such expressions as 'INT(19 ★ SIN(5 ★ angle)^2)' which includes all the operations integer, multiplication, sine, and power? Obviously, Sinclair must have written the code to perform all of those functions into the Spectrum operating system, and it has been kind enough to make them all easily accessible to the distraught machine code programmer. They are all accessed using the RST 28H instruction.

We will examine that and similar instructions in a later article, so don't worry about exactly how it works just now, but meanwhile here is how to use it. The RST 28H instruction expects to be followed by a list of numbers, terminating with the number 38H. That list of numbers tells the processor which operations to perform on the numbers in the calculator stack. All those codes are shown in figure three.

If we want to multiply the two numbers at the top of the calculator stack, and then take the integer of the square root, we can write the code:

```
RST   28H   : Start calculation
DEFB 04H    : Do multiplication
DEFB 28H    : Take square root
DEFB 27H    : Want an integer result
DEFB 38H    : End calculation
```

The only remaining problem is to place numbers onto the calculator stack and retrieve the result. That is done by calling the appropriate ROM routines:

2D28H — transfer integer A to

continued on page 56

Figure 5.

```
  10 CLEAR 53759
  20 POKE 23728,0: POKE 23729,21
0
  30 GO SUB 1000
  40 CLS : PRINT AT 1,1;"SINCLAI
R"
  50 PLOT 6,159: DRAW 67,0: DRAW
 0,9: DRAW -67,0: DRAW 0,-9
  60 LET x1=6: LET y1=159: LET x
2=74: LET y2=168
  70 LET x3=200*RND: LET y3=120*
RND
  80 LET x4=255*RND: IF x3>=x4 T
HEN  GO TO 80
  90 LET y4=158*RND: IF y3>=y4 T
HEN  GO TO 90
 100 POKE 60227,x1: POKE 60228,x
2
 110 POKE 60229,x3: POKE 60230,x
4
 120 POKE 60231,y1: POKE 60232,y
2
 130 POKE 60233,y3: POKE 60234,y
4
 140 RANDOMIZE USR 60000
 150 GO TO 70
 160 STOP
1000 REM HEX LOAD ROUTINE
1010 DEF FN p(x)=CODE h$(x)-48-7
*(CODE h$(x)>=65)
1020 LET byte=0
1025 LET chbyte=0
1030 RESTORE 2000
1040 READ start
1050 READ h$
1060 IF h$="*" THEN  GO TO 1160
1070 IF LEN h$<>2*INT (LEN h$/2)
 THEN  PRINT "Odd number of hex
digits in: ";h$: STOP
1080 FOR i=1 TO LEN h$
1090 IF NOT ((h$(i)>="0" AND h$(
i)<="9") OR (h$(i)>="A" AND h$(i
)<="F")) THEN  PRINT  "Illegal h
ex digit: ";h$(i): STOP
1100 NEXT i
1110 FOR i=1 TO LEN h$ STEP 2
1120 POKE start+byte,16*FN p(i)+
FN p(i+1)
1125 LET chbyte=chbyte+PEEK (sta
rt+byte)
1130 LET byte=byte+1
1140 NEXT i
1150 GO TO 1050
1160 PRINT "Code entered"
1161 PRINT chbyte
1162 READ checksum
1164 IF checksum<>chbyte THEN  P
RINT "Wrong Checksum": STOP
1170 PAUSE 150
1180 RETURN
2000 DATA 60000,"CDA5EA"
2010 DATA "2143EB","CD7EEA"
2020 DATA "ED434BEB","2147EB"
2030 DATA "CD7EEA","ED434DEB"
2040 DATA "CDBEEA","CDB2EA","C9"
2050 DATA "46","23","7E","90"
2060 DATA "47","0E00","E5"
2070 DATA "CD2B2D","0601","0E00"
2080 DATA "CD2B2D","EF","0F"
2090 DATA "38","E1","23","46"
2100 DATA "23","7E","90"
2110 DATA "CD282D","EF","A1"
2120 DATA "0F","05","38"
2130 DATA "CDA22D","C9"
2140 DATA "210040","ED5BB05C"
2150 DATA "010018","EDB0","C9"
2160 DATA "2AB05C","110040"
2170 DATA "010018","EDB0","C9"
2180 DATA "DD2143EB","DD5600"
2190 DATA "1E00","DD6E02"
2200 DATA "DD4604","0E00"
2210 DATA "DD6606","E5","D5"
2220 DATA "C5","4A","110040"
2230 DATA "E5","CD13EB","C1"
2240 DATA "ED5BB05C","A6"
2250 DATA "2807","CD13EB","B6"
2260 DATA "77","1806","CD13EB"
2270 DATA "2F","A6","77","C1"
2280 DATA "2A4DEB","09","44"
2290 DATA "4D","D1","E1","24"
2300 DATA "DD7E07","94","30D0"
2310 DATA "E5","2A4BEB","19"
2320 DATA "54","5D","E1","2C"
2330 DATA "C8","DD7E03","95"
2340 DATA "30B8","C9"
2350 DATA "D5","79","E607","5F"
2360 DATA "CB39","CB39","CB39"
2370 DATA "3EAF","90","47"
2380 DATA "E638","CB27","CB27"
2390 DATA "B1","6F","78","E607"
2400 DATA "67","78","E6C0"
2410 DATA "CB3F","CB3F","CB3F"
2420 DATA "84","67","43","04"
2430 DATA "AF","37","1F","10FD"
2440 DATA "D1","19","C9"
2450 DATA "01020304","01020304"
2460 DATA "0000","0000","*"
2470 DATA 27156 : REM Checksum
```

continued from page 55

calculator stack;

2D2BH — transfer integer BC to calculator stack;

2AB6H — transfer AEDCB to calculator stack;

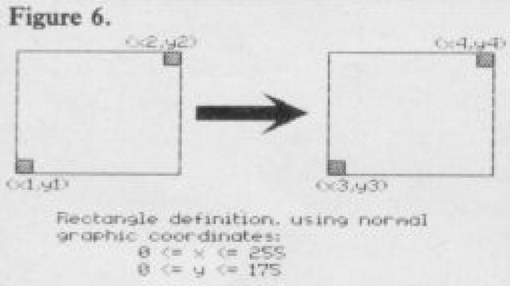
2DD5H — transfer top of stack to integer A;

2DA2H — transfer top of stack to integer BC;

2BF1H — transfer top of stack to AEDCB.

To see more clearly how this works, look at the routine DIVIDE in this month's program shown in figure four. As usual, we have included a Basic loader and application program in figure five. Due to the length of the program, there is an extra feature to the Hex Loader routine. That is a checksum, which adds up to the total value of all the bytes, and then checks that against the total at the end of the data. The lines to add are 1025, 1125, 1161, 1162 and 1164.

Figure 6.



The routine will allow you to define a rectangle on the screen as (x1,y1) and (x2,y2). That will be magnified or reduced to a second rectangle (x3,y3) and (x4,y4), as shown in figure six. The new rectangle will replace the corresponding picture — if any — on the present screen, and the final merged version will be displayed. In order to magnify and reduce without corrupting the original data, the routine uses an alternate screen, the start location of which should be stored in the two locations 23728 and 23729 (line 20).

The routine works by stepping through every pixel in the second rectangle and checking the associated pixel in the first rectangle. The non-integer stepping factors for the first rectangle are held in DX and DY. Those values are sufficiently flexible for you to multiply one pixel to the complete screen, or vice versa, although that would not be particularly interesting.

Next month we will look at the powerful Z80 instructions which allow you to manipulate large sections of memory quickly and easily, and assess the potential they have for interesting graphics.

Figure 7. New Z80 instruction codes

ADC	A,byte	— Add the value byte to the accumulator, including the carry.
ADC	A,reg	— Add the contents of the register to the accumulator with carry.
ADC	A,(HL)	— Add the contents of the location addressed by the HL register pair to the accumulator, with carry.
ADC	HL,rp	— Add the register pair (BC, DE or HL) to the HL register pair, with carry.
SBC	A,byte	— Subtract the value byte from the accumulator, with carry.
SBC	A,reg	— Subtract the contents of the register from the accumulator, with carry.
SBC	A,(HL)	— Subtract the contents of the location addressed by the HL register pair from the accumulator, with carry.
SBC	HL,rp	— Subtract the register pair (BC, DE or HL) from the HL register pair, with carry.
CCF		— Complement carry flag (0 to 1,1 to 0).
SCF		— Set carry flag to one.
DAA		— Convert contents of the accumulator into binary-coded decimal form.

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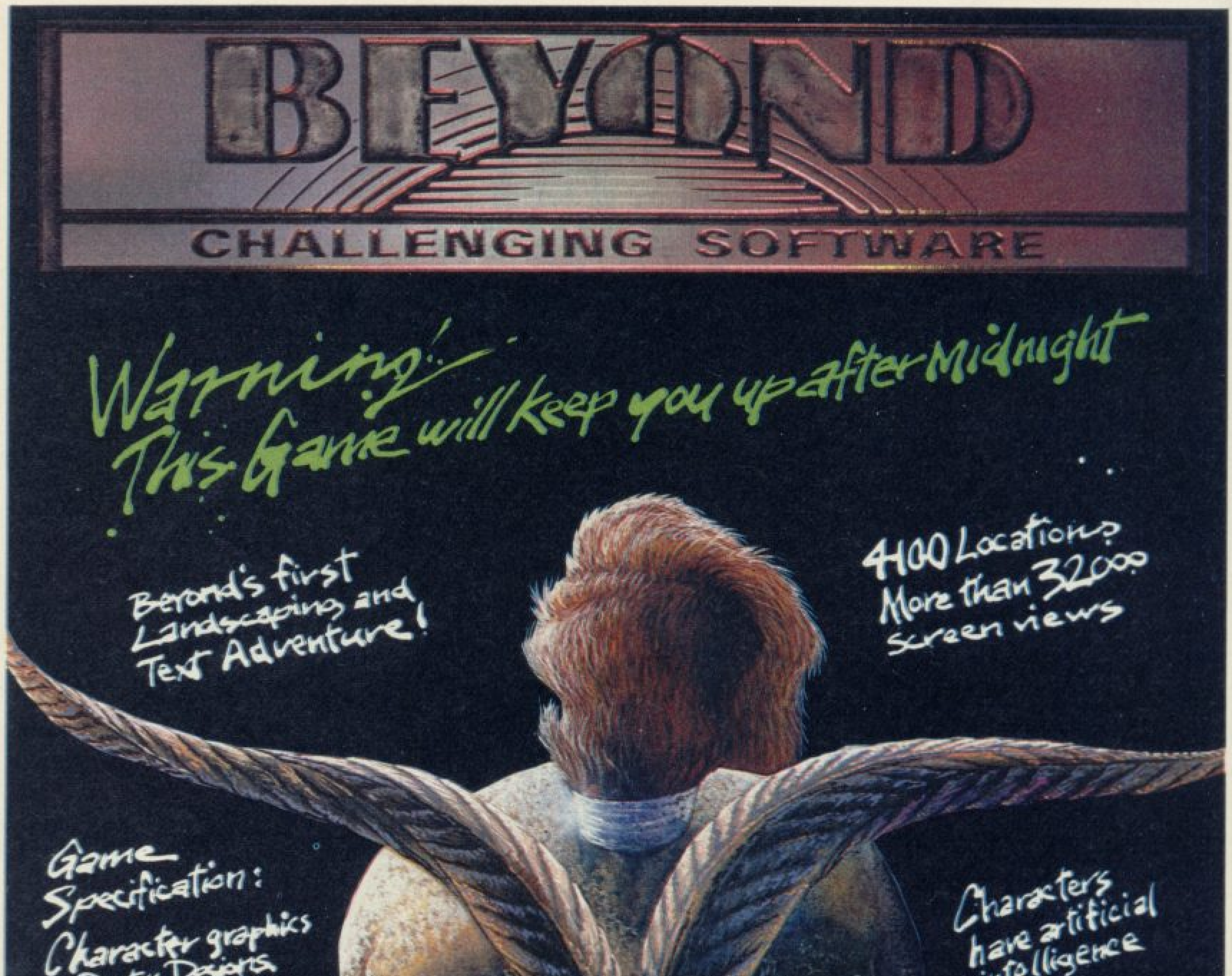
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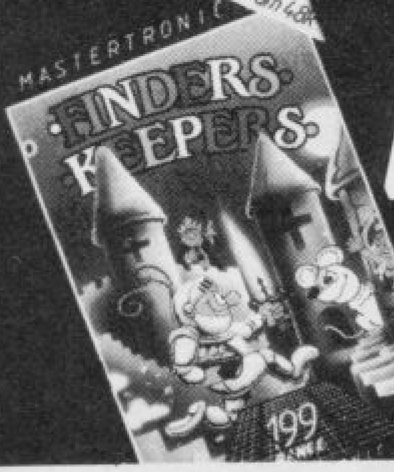
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Fighting the pirates

Wendie Pearson looks at the latest in a long line of weaponry brought to bear by the battle-weary software industry



AS THE ARGUMENTS surrounding software piracy rage on and on, a new act has come into force which will deter serious, organised pirates from operating, even if it cannot be used to gobble up all the amateur pirates in towns the length and breadth of the country.

The law

The Copyright — Computer Software — Amendment Bill, passed in July, is supported by an array of people in the trade who really mean business. Members of the Guild of Software Houses — GOSH — and the Federation Against Software Theft — FAST — have supported the bill from its conception as a private members' bill, and helped to push it through parliament.

The bill ensures that computer software is covered by the 1956 Copyright Act, which means that the plaintiff will not incur any legal costs, thus making action possible where it might not have been before. Anyone selling, exhibiting or possessing pirated software will face a fine of up to £2,000 for each offence, or prison for up to two months. Making, distributing or importing such material will carry an unlimited fine, or up to two years in prison, or both.

The enforcement

The bill received royal assent on July 16. Nick Alexander of Virgin, who is also director of FAST, says he is very relieved to see that Robert Hay, a retired chief superintendent of the Metropolitan Police, has taken on the job of enforcement co-ordinator for FAST. Bob Hay's working history covers the Grunwick dispute, the Iranian seige and day-to-day duty in Southall, all of which is enough to make most people quake at the knees.

Software theft costs the industry over £150 million each year in lost sales. Hay's presence may prove reassuring, especially since the industry is going through exactly the same problems as the music industry has done, according to Alexander.

Hay is keen to point out that piracy should be seen in the same light as theft. "The Americans call piracy 'softlifting' and as far as I'm concerned, the public should take the same view of someone who lifts £500 of software as they would of someone who took £500 of goods from a shopkeeper," he says.

Hay emphasises how dishonest he thinks the practice is, and how it does others out of an income. "Piracy inhibits investments and innovation and, ultimately, it will cost jobs which are there in an expanding industry. The public will suffer the effects, because loss of choice will result. Piracy means that companies don't get a return on their investment."

Hay's job will be to enforce the new law via FAST. "Unlike the music or video industries, the problems of the micro games industry are quite different," he says. "When we receive information that a company's software is being pirated at particular premises, we can get in touch with the appropriate authorities who will take the matter further."

"Ninety per cent of software on the market isn't worth the asking price" – Nick, pirate

Hay will keep an eye on incidents of piracy, how and when those occur, and advise member companies of FAST on the amendment. He will also work on making the counterfeiting of products more difficult.

The history

So, what is piracy? Mark Tilsen, formerly production manager for Quicksilva, says there are three kinds: copying by the user so he can pass the stuff on to his mates, encouragement to copy by a retailer by way of renting out or lending software, and counterfeiting.

The latter is the kind used in organised crime whereby people make games which appear to be original copies but aren't. Many of those sell at markets and from street traders and often those vendors do not realise the seriousness of what they are doing, according to the Trading Standards Authority — TSA — and the Advertising Standards Authority — ASA.

Tilsen estimates that for every copy bought, seven copies are made by users for their friends. On the subject of renting or lending out software, Jeff Brown, managing director of US Gold, shares Tilsen's opinion: "This is a pure incentive to copy."

US Gold produced a court order in January this year, ordering a number of public libraries to return US Gold software at once, after the company found out that their games had been lent out in the same way as books.

DEC's senior commercial lawyer, Roger Tuckett, confirms that you are allowed to make a backup copy of something if it has been negotiated with the manufacturer first. He points out that distribution of copied software is the most likely thing to get you into trouble.

Stories of piracy are legend. Philip Morris, managing director of English Software, phoned in response to a small ad in a magazine, only to be offered pirated copies of his own software. Much to his horror, he was asked to make out a cheque to the pirate's mother in payment.

Tim Langdell, managing director of The Edge and executive member of GOSH, quite often receives faulty tapes back from software shops, which are not originals.

Other horror stories abound, such as that of one software house employee who went to a computer club meeting to find all the members busy copying his software. And then there was the case of a certain London Borough which ordered only one program from a software house, rather than several.

Software houses have been busy chasing pirates from other shores, too, with most problems occurring in Europe, the far east and Australia. US Gold have had problems in Germany, Spain and Italy while the Quicksilva had their worst problems with Portugal. At one point, says Rod Cousens, formerly of Quicksilva, 23 companies there were copying his games and there was nothing he could do about it.

One particularly busy outfit in Germany operates as an international computer club and copies software from the US before sending it on and distributing it at reduced prices to members in the UK and Europe.

Generally speaking though, laws abroad are much clearer on software copyright and counterfeiting and hopefully the new law will bring Britain in line with other countries in this way.

The protection

Last summer, heads rolled when various software company personnel, including Richard Turner of Artic, Roger Gammon of Anirog and Jeff Brown of US Gold, staged dawn raids on four private homes along with police and solicitors — imagine wak-

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ing up to find that lot on your doorstep! Many other software houses including Mirrorsoft, A 'n' F, Software Projects and Virgin gave their support to the raids.

Other steps taken by software houses to protect their goodies have been less dramatic and involve everything from colour coding of tapes to turbo-loading.

In the case of a fast or turbo loading tape, copying is made difficult because the game is loaded at such a fast rate that the signals are scrambled, although that doesn't affect the original game when it is played.

Hewson Consultants' game **Avalon** has a security sheet printed in 'fugitive ink' so that it will not photocopy, and the company also uses a turbo load system. There are a number of other methods which Andrew Hewson, managing director, will not go into. "We've constructed our defence in a number of ways," he says.

Software Projects has used a colour coding system, so that when you have loaded a program, you have to type in a set of colours in a particular sequence. Those are given with the documentation.

Michael Fitzgerald, managing director of A 'n' F, has introduced holographic labels which make copying difficult, and has settled a few piracy situations out of court this year.

"I see the schoolkid syndrome as something we have to live with," he says. Fitzgerald's attitude is that if someone sees your game in the first place and they like it, they are more likely to buy your next one.

Jim Lamont, managing director of JLC Data in Barnsley, developed a software protection device last year, which was promptly confiscated by the Ministry of Defence. It was subsequently refused a patent.

Although the incident was shrouded in mystery, the MoD has shed some light on the affair. A spokeswoman says, "We can withdraw a product for a year if we think it could be useful to us, and withhold the patent on it. The device concerned stopped you copying anything which had been put onto magnetic media of any kind. The other thing the MoD looks at is whether a device is listed as 'sensitive' or could be useful to Warsaw Pact countries if exported.

"A prohibition order was put on the patent in early 1984, but has since been lifted," she says, "as the device wasn't found to be as sensitive as originally thought."

The prohibition order was lifted by the Patent Office after a question was raised on the matter in Parliament in April. Up in Barnsley, however, Lamont says he had been told not to talk about it.

The thin line

The argument concerning the small advertisements offering pirated copies in the backs of magazines is likely to continue, although Rod Cousens, now a consultant for Incentive Software, speaks for many when he says: "Anything which gives more protection is



helpful and I think it will place more pressure on magazines to scrutinise their adverts."

However, Charles Hendry, information communications adviser of FAST, confirms that it is not illegal to advertise something which is illegal — it is only illegal to use the service. In other words, anyone advertising devices which enable the copying of software is not breaking the law.

At the same time as the bill went through, computer and hi-fi company Amstrad ran into trouble with their twin deck cassette system, and two other companies, Mirage Computers and the Micro Centre, brought out copying devices.

How do the companies feel about the implications of the new law? Bob Hitchcock, director of Micro Centre which makes Interface 3 — a combined hardware/software package for tape and microdrive copying — says the piracy outcry is "a load of rubbish."

"It doesn't affect sales in any way," he says. "We've been selling products of this kind for two years and, if anything, it's increased software sales. It's all a fuss about nothing. Look at the record industry — they sell more records now than they ever have done.

"Interface 3 doesn't encourage piracy. The piracy thing should be aimed at people who copy the inlay cards, and so on, too. After all, when people hear a record, they go out and buy it — hearing it encourages people to buy."

A similar device to Interface 3 is the Microdriver, brought out by Mirage. That serves the same function but also does tape to tape copying too. Both devices sell for £39.95.

Over at Mirage, the attitude to piracy is quite different. Director Gerry Bassingthwaighte says: "Our unit copies the program and saves it in encoded form so that unless you have a microdriver plugged into your Spectrum, you can't reload the program. That means that if someone bought our device for piracy, he is wasting his time. He could make as many copies as he wanted, but if the people he sold them to don't have our device, they can't use the programs. You can do tape to tape copying on our device too, but in the same way, it can only be loaded using a Microdriver."

He says he understood why Amstrad had got into trouble over their device. "Their adverts encouraged people to rip off music and software. In all our promotions, we stress that it's for backups and we've taken lengths to ensure it can't be used for piracy. The problem is, lots of software houses don't let you make backup copies . . ."

Over to Amstrad, who are understandably sensitive on the matter. Marketing manager Malcolm Miller says "The British Phonographic Industry — BPI — took exception to the way Amstrad was advertising a high speed dubbing power system, which allows you to do tape to tape copying at twice the normal speed, and they wrote to our retailers about this."

Amstrad then hauled the BPI off to court. "We wanted to declare that what we were doing was lawful," says Miller. "We asked the courts for a declaration on what they thought was lawful, but the High Court said they couldn't declare that what we were doing was lawful. So Amstrad will appeal, and will be heard this autumn, in the Court of Appeal.

"We don't condone any infringement of copyright," he adds. "Remember that we ourselves produce copyrighted material, so it wouldn't make sense."

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Amstrad are continuing to sell the systems, which range from £159 to £199. "We haven't been placed under pressure to withdraw them from sale and we haven't been banned from doing anything," says Miller.

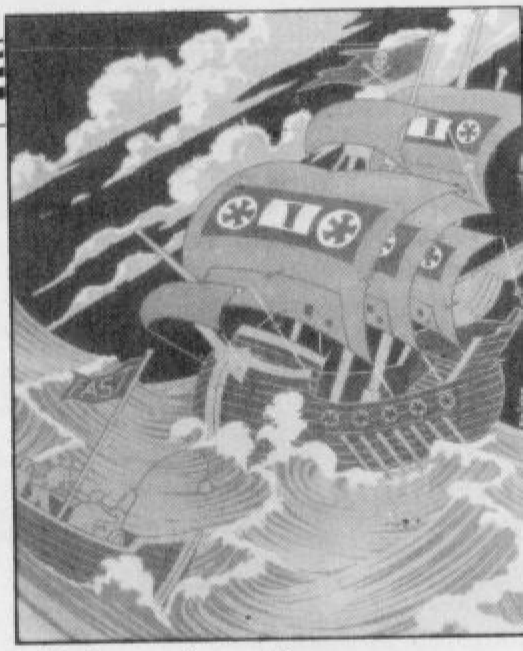
"It's all very well to talk about piracy. We regard our tape copier in much the same way as selling knives which kill people, cars which break the speed limit, videos which record TV and stereo units which record LPs."

The pirates

So, prohibition order aside, why have software houses failed so miserably in their attempts to deter pirates? The answer may be summed up in the words of one software house chief who said glumly: "The kids break into security devices as fast as they're invented."

Three schoolboys who pirate their games with the same regularity as most of us drink coffee gave us their views.

David, 18, believes piracy is justified because prices are too high. "I've never bought a piece of software in my life," he gushes. "I never have, or



will, buy software."

How does he do it? "I have a very expensive hi-fi deck which lets me do an excellent back-to-back copy. It's called high-speed dubbing. If I want discs copied, I use a disc-copying utility sold by a reputable company. Practically everyone I know pirates stuff."

On the new law, David feels it will be totally ineffective when it comes to individuals, but that companies should be caught. "Jobs are only lost in the industry through large-scale pirating operations. I think software houses themselves do a lot of pirating — they break into the code for a routine whch they'll find useful for their own programs. They will deny this, but it's an absolute fact."

James, also 18, says: "Tapes with turboloads are difficult to copy, so you have to break into those programs using certain techniques. You can put the game into memory, or you can break into it. You can also transfer your games onto disc, but that takes time."

Why does he do it? "By the time you've forked out money for disc drives and the micro itself, there's no cash left. It's not done to own a micro and not pirate." Summing up, James feels that if a game costs over £1.99 he may as well pirate it.

Nick, 16, believes that everything boils down to how good a game is. He reckons that if it is really good, people will pay for it, but if it is only average, they will copy it. "Ninety per cent of software on the market isn't worth the asking price," he says. "Anyway, I reckon most of the software houses pirate each other's stuff on the quiet."

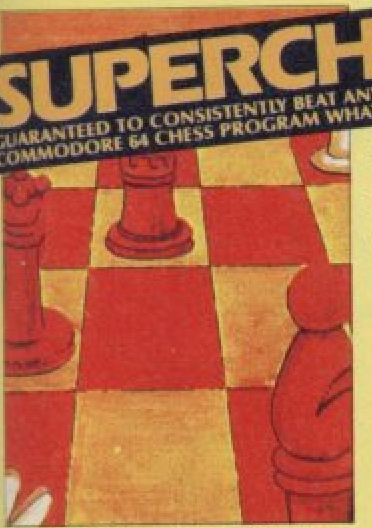
On passwords, he says: "They don't always keep people out. If you write a program which asks for a password, the program must know that password. So if you look at the program carefully, you'll find it."

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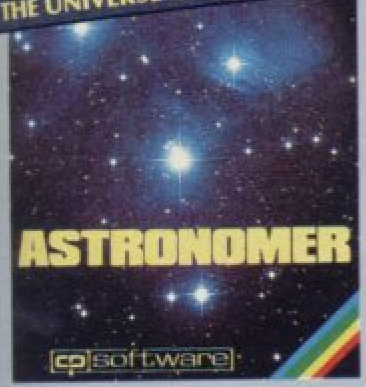
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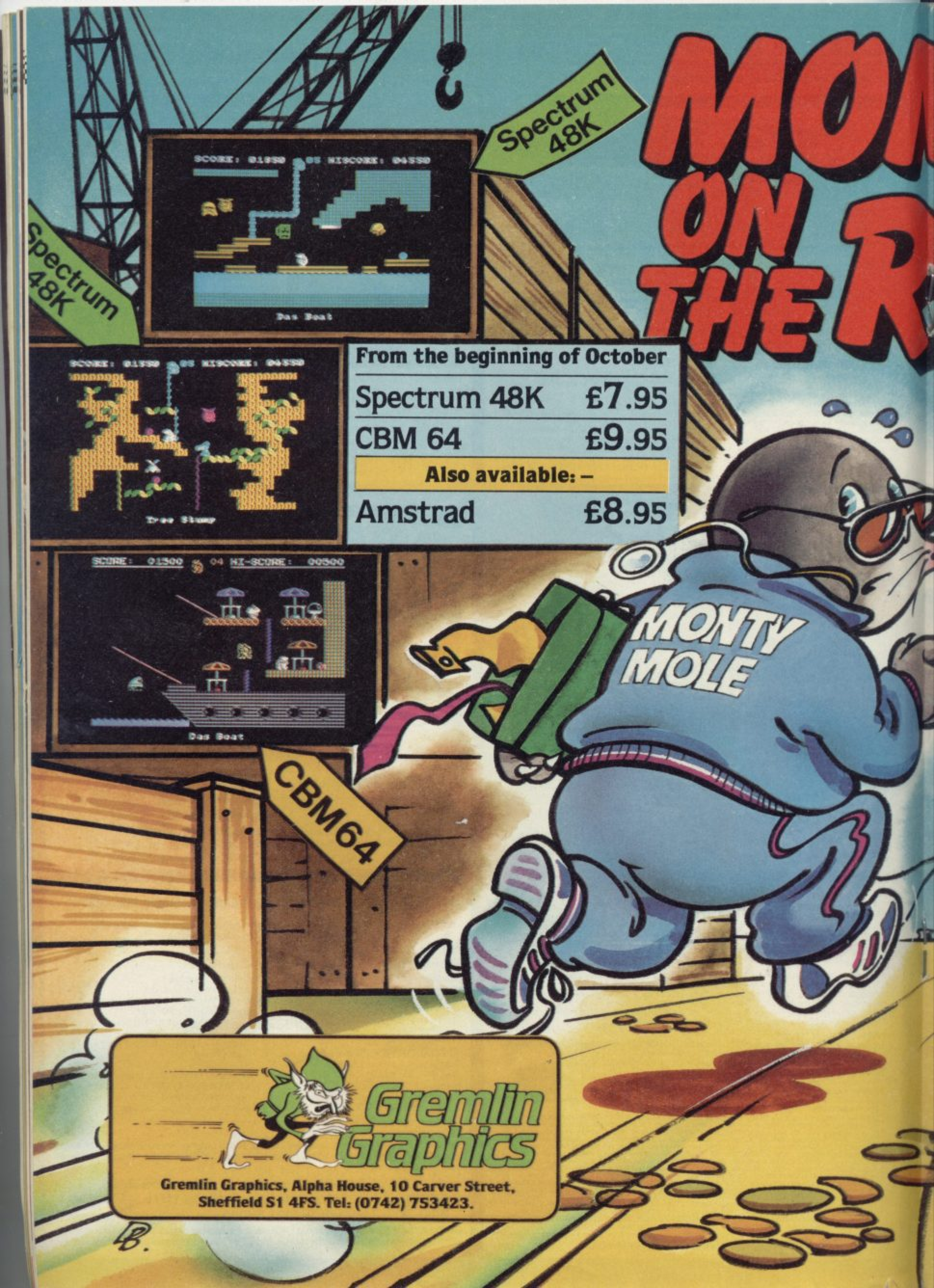
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Illustration: Craig Kennedy

Going it alone

So you want to start your own software house? Clare Edgeley talks to the entrepreneurs

YOU'VE DEVOTED a year of sleepless nights to writing a game which beats all others hollow. Now comes the difficult bit: how are you going to sell it?

Your options are few. You can sell the game to a well-established software house. In the unlikely event of them liking it, they will pay an advance and royalties, and leave you to concentrate on your next blockbuster. We travelled down that well-trodden path in the August issue of *Sinclair User*.

Or you can decide to go it alone, and either sell the game by mail order or submit it to distributors who will then sell it into the high street.

This month we find out what it's like being a mail order minnow abroad in the predatory seas of the software industry.

Past and present

Five years ago, when the industry was in its infancy, mail order was the only way to sell games. The distributors had not yet muscled in to control the software scene. As the market grew and high street stores like W H Smith and Boots opened computer departments, distributors became necessary to control the flow of games into those stores and the increasing numbers of computer shops.

Selling games by mail order is not as simple nowadays. With the wealth of games available in the shops, there is no real call for anyone to go to the bother of sending off for a game, with the wait which that entails until it is received. Unless, that is, the game is not available in computer shops.

"Mail order is for the small boys," says Domark's Dominic Wheatley. "With mail order you don't know when you'll get the product — it's a big turn off for the punter. If the game is faulty, it's much easier going into a shop to exchange it."

Domark has sold about two or three per cent of its total sales through mail order, catering for those who live abroad and for those whose local computer shops do not stock a full range of games.

Automata's Christian Penfold disagrees. "With mail order you've got the advantage of being able to sort out faults very quickly and to tell whether it is the tape or micro which is at fault. There is a definite need for mail order companies and I'm trying to make 1985 the year of the postage stamp. We work on the assumption that if you've made the effort to take your order to a post office, you deserve that order to go out the day we receive it." Automata started off as a mail order company, later sold through the distri-

butors and experienced such problems that it has reverted to mail order again.

Packaging

Many small software houses have to survive on mail order sales only, as distributors will not handle their products. George Clough, of Manx Tapes, runs a small one-man outfit through which he has tried to market his business program, **Classic Bookkeeping**: "No distributor will look at my programs. Terry Blood Distribution likes it but won't take it on because it doesn't have fancy packaging and it won't fit onto the shop shelf. Packaging it professionally would be a silly waste of time and money. To have the manual for my program printed, I would have to order about a thousand copies and boxes to make it pay." However, it is unlikely that Clough will have as many as a thousand orders.

Laurie Sinnett, now working as a programmer for Sentient Software, ran into trouble when he tried to market his program **Dietmaster** two years ago from his company Delta 7. "I had a couple of really good reviews but it flopped. The distributors wouldn't take it on as the packaging was so poor."

Publicity

If you want to increase sales by getting your software into the high street, you must approach the distributors. That means you need a good quality product with good quality advertising and packaging. A review or two in the computer press also helps.

Delta 4 is a small software house run by Fergus MacNeill and three friends. They are 16, have just left school and are going to college. The company is run from home on a part time basis and is doing extremely well, considering it caters only for the lunatic fringe of the adventure market.

MacNeill depends heavily on reviews and has had great success with **Bored of the Rings** — a Sinclair User Classic — which he has recently sold to Silversoft. "Initially we did hardly any advertising and sent out no review copies, which is why we didn't get much publicity. From the **Quest of the Holy Joystick** onwards we relied heavily on reviews. If we get a good review, we receive more orders and sell up to 100 copies a week over all our games."

"We get large numbers of enquiries after a review", agrees Sentient's Laurie Sinnett. "If we do get to the stage where we advertise, it will depend on the review that game gets."

Advertising can be a costly business. Classified adverts are the best bet and it is essential to bring your product to the readers' attention. Even if it has been reviewed it is necessary to inform people where they can obtain it.

"You've got to create a convincing advert and you've got to make sure you get your money back," say Hewson Consultants' Andrew Hewson. "Do a survey of all the classified adverts in the different magazines, and if people are advertising consistently in the classified pages, they are earning money. See what type of advert they are placing, in which magazine and for what product."

Most adverts placed by small companies are about three centimetres deep and one column wide, costing between £20.00 and £45.00, depending on the magazine. A large magazine charges more for advertisements but it is read by a greater number of people. You must decide how much you can afford and how many tapes need to be sold to pay for that advert, and still leave a profit.

"There is a need for mail order. I'm trying to make 1985 the year of the postage stamp"

"My father keeps the books", says Fergus MacNeill, "and our policy is that we will not get into debt. We only advertise if we've got the money — we don't buy things we can't pay for."

MacNeill explains why more money can be made by selling a game mail order. "We lose out a lot by not having our products on the shop shelves, but by selling mail order we make more pounds per copy. We don't pay the distributors 55 per cent discount. The real costs — after duplication, buying the tapes and printing the cassette inlays — are buying jiffy bags and stamps."

However, although more is made by Delta 4 per unit, compared to the volume sales created by huge advertising campaigns and impulse buys in the high streets, the small mail order company loses out.

Cautionary tales

Asvoguelle is one company which has fallen by the wayside. Peter Percy, 27, set it up in November 1984, to market his game **Mount Challenge**, with the help of a £1000 loan from his father and financial assistance from the Manpower Services Commission. Peter was away looking for a job when we tried to contact him, but his father gave us some details.

"Peter did a lot of work before November and wanted to launch **Mount Challenge** on April 16 of this year." He booked two adverts in the computer press and had one direct response for the game. In fact, he had to send that copy out twice as it got lost in the post the first time. He also sold four or five copies locally and had two enquiries — from France and Spain. **Mount Challenge** was reviewed once in *Crash*.

"Peter got everything ready before the launch date as he didn't know what the response would be," says Mr Percy. "I expected 40 or 50 enquiries." He has now got 900 tapes waiting to be sold — the packaging and printing were done professionally and he even bought all the jiffy bags.

"Peter closed Asvoguelle in mid-July. I hope he'll advertise again. He's very disheartened." Peter Percy was a sole trader, which means that he would have to pay any debts incurred. Fortunately, he paid for everything as he went along and does not owe any money.

Micromania's Dominic Wood is similarly disheartened. "My advice to anyone starting off in mail order is not to bother. If your game's good enough, one of the top five software houses will take it and you will be paid a royalty."

Two to three years ago, Micromania sold around 200 games a week and could afford to advertise in magazines. "Now it's more like two or three units a week, through mail order."

Micromania started by selling its games through mail order in 1982. Last year the distributors took on its games — **Kosmic Kanga** sold 10,000 copies — and a few months ago Micromania went bankrupt through problems with credit control. Even if the distributors do take on your game, it is not a guarantee of success.

"There's no room for small companies, and no chance of gaining a foothold unless you've got some

continued on page 71

Illustration: Craig Kennedy

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continued from page 69

marketing skill," says Wood. "You can't make a living dealing solely in mail order — I would be surprised if a new company, advertising its games, sold more than 12 units a month."

Hewson Consultants and Domark feel the same. Hewson reckons on less than a half a per cent of his total income comes from mail order sales and Domark's Wheatley thinks he earns two to three per cent. Hardly enough to keep a cat alive, let alone pay for wages and equipment.

Surviving

Sentient Software sells its adventure games through mail order, but that comprises only a very small slice of the business. According to Laurie Sinnett, the major bulk of the company's income is derived from contract work — doing conversions, and a lesser amount from distribution. Sentient is the sole distributor for Memotech software in the UK.

Sentient would not be thriving today if it had to rely on the income from its games. It needs the conversion work and distribution deal to keep the software side alive.

Even though Laurie Sinnett's first venture, Delta 7, failed, he does not regret the time spent trying to make it a success. His advice: "Try it. It was great fun and I learnt a lot from it even if I didn't make much money." Delta 7 was closed before it could run into debt.



George Clough of Manx Tapes is retired and became interested in the Spectrum as a business micro about two years ago. He wrote **Classic Book-keeping** and believes in advertising to keep his products in the public eye, but doesn't need to rely totally on the income the program might make for him.

"What I've invested is two years of my time. I've been struggling since last August, when I advertised in *ZX Computing* three months in succession — the sales from those ads didn't cover the cost of advertising, and I'm down quite a few hundred. I'm not interested in selling 10,000 copies a month, I'm interested in serious programs."

Taking the plunge

If you want to set up your own company you can either be a sole trader or form a limited company. Being a sole trader offers no security if the company is unsuccessful, as you will be liable for any debts incurred. On the other hand, you will not need to appoint shareholders, hold annual general meetings or have your accounts audited yearly as would be necessary if you set up a limited company.

A limited company does offer security. If you should go bankrupt, you will be liable only for the money you invested in shares. Limited companies can be bought off the shelf for about £115.00 — just contact any one of the Company Registration Agents listed in the Yellow Pages and they will sell you a ready-made company.

Setting up a limited company yourself involves more work but it is simple nevertheless. You can buy the Memorandum and Articles of Association from a law stationers plus the necessary forms — G12, application for registration of the company; PUC1, paid up capital, which must be as little as £1.00; G10, statement of Directors and Secretaries attending the registration office.

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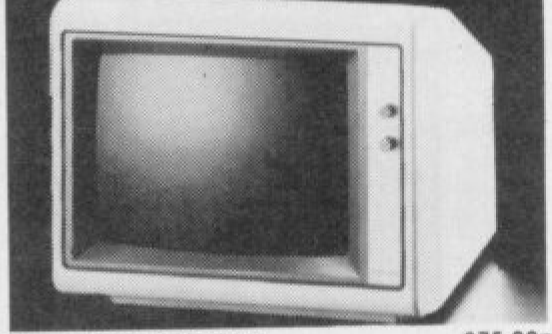
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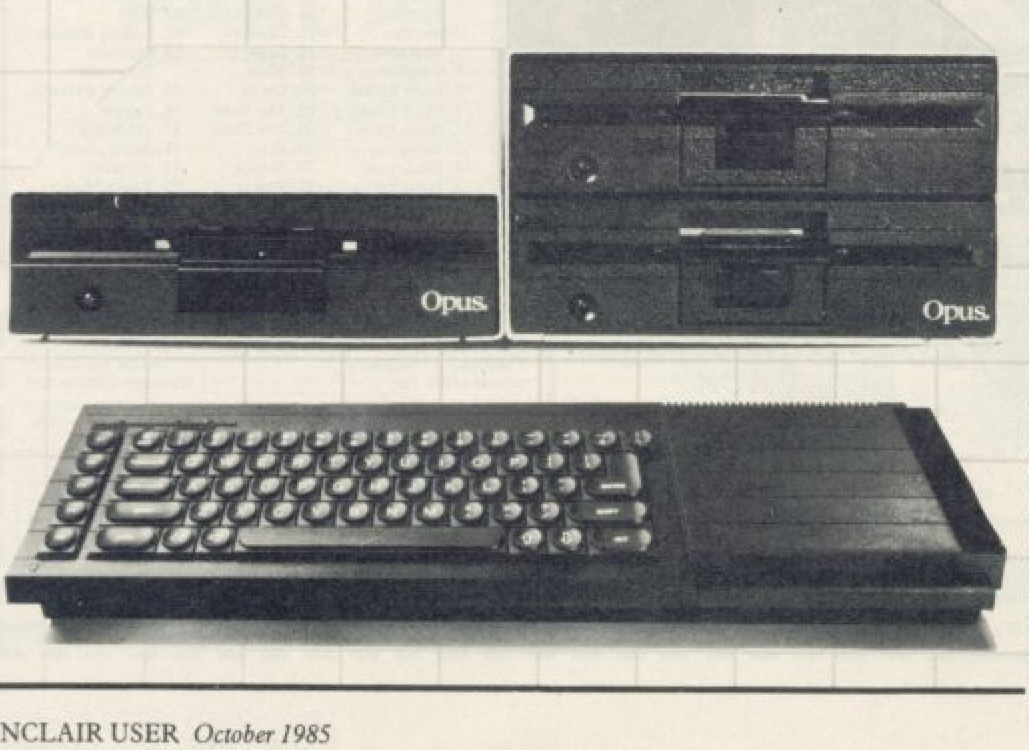
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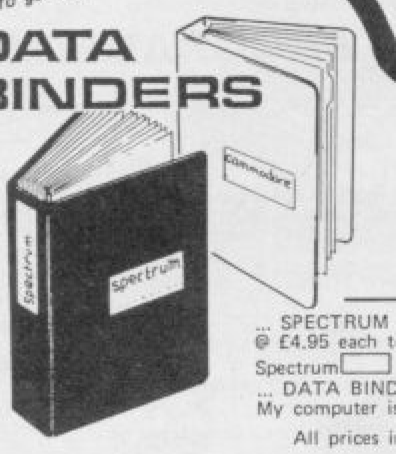
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```
  10 FOR n=1 TO 10: PRINT n: NEXT n
as:   10 FOR n=1 TO 10
           PRINT n
         NEXT n
```

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VISA

Letta-Head

BRADWAY Software, a small, new, software house, has released **Letta-Head** for the Spectrum and Epson-compatible dot matrix printer. It is designed to personalise your own stationery, but has a variety of uses, including labels, posters, order forms and invoices. A special option allows cassette labels to be designed without printing over the hole in the middle.

It is run from a series of menus and prompts in the bottom eight lines of the screen. Options are selected by single key entry. The only exceptions are the escape option which is CAPS SHIFT and 1, and where numbers greater than 9 can be entered. The top 16 lines are used for designing the two options of heading and label.

The design features allow text to be added in any one of six fonts, including user-defined graphics. You can vary the height and width of the characters independently, from one to nine character squares. Graphics can be added through the Art option which plots points, draws straight lines, arcs and circles. It also features a fill routine.

Another option allows you to draw boxes with the border varying from one to nine pixels in thickness. The text graphics and boxes are all defined by moving a flashing cursor and using ENTER to mark the corners. Unfortunately, the cursor does not move particularly quickly and it would be nice to see it increase speed when the keys are held down.

If you decide that part of your design is in the wrong place, it can be independently scrolled using the cursor keys, by marking a box around it, to another part.

Plotting graphics is a long and tedious job. Not only must each pixel be plotted individually but CAPS SHIFT is still needed to use the cursor keys. To save time, designs — saved as a SCREEN$ — from graphics packages or other sources can be loaded and altered. All or any part of the design can be erased, and again that is done using the cursor to mark a box round the offending area.

Two useful features are the ability to overlay a chequered grid, to aid design, and the reservation of an area of memory which will hold the design. A design held thus can be loaded back replacing the one on screen or merged with it. You can also exchange the two designs.

Before you design a label, you must select its size. Four choices, three fixed and one user-definable, are offered for both the width and height of the label. In practice, despite a maximum set size of 5in×1 15/16in, I found that the printing never exceeded 4.25in×1.5in.

The printing options vary considerably. For labels the only variables are the number to be printed, the number across the paper and the horizontal and vertical separation. For headings the print height and width, the left hand margin and the sheet length can be set. Each sheet can include its own numbering system, starting from any given alphanumeric.

My initial reaction was that **Letta-Head** would make a useful program for the home but that it might be limited for office use. By the time I had explored it, however, I was prepared to look more favourably upon it. Nevertheless the quality of the printed large-size characters is not sufficient to make the correct impression in business. Using logos created on a graphics package could produce acceptable results. *Mike Wright*

Publisher Bradway Software, 33 Conalan Avenue, Sheffield S17 4PG
Price £7.50 **Memory** 48K
★★★

Plumbers' Price



Illustration: Stephen Wright

FOLLOWING **Building Price**, designed to calculate the cost of materials used in the construction of a building, author J Redman has turned his attention to plumbing.

Plumbers' Price and **Plumbers' Price** (**Drains**) are also used for costings but could be used at the planning stage to estimate the cost of different pipe runs.

A program synopsis is supplied but the main instructions are held as a program on one side of the cassette. The instructions are written in a kind of shorthand, making them difficult to understand. It is also likely that reference to them will be needed while the program is being used, and that is not possible when they are only on cassette.

Before reaching the main menu you enter the job name and date. The main menu allows plans to be drawn, materials listed, the file to be saved and the price to be calculated. The majority of the work is likely to be spent on drawing the plans in 3D.

The draw option allows for any of three types and 10 sizes — four in the drains version — of pipe and for either type or size to be changed at any stage. There are extra categories for your own type and size. The pipe currently being used is shown in the top left corner of the drawing, while the name given to the drawing is top centre and in the bottom right corner is a representation of the keys used to draw the diagram.

The choice of L(eft), R(ight), U(p) and D(own) is easy enough to understand but the choice of O, P, J and K

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"There is no better justification for buying a 464 than this program." POPULAR COMPUTING WEEKLY NOVEMBER 1984

A particularly sophisticated yet easy to use program. Now available on disc. The cassette version is supplied with instructions for transferring to disc.

TASWORD 464* Amstrad CPC 464 & 664 — cassette **£19·95**, disc **£22·95**

TASWORD 464-D

This is the new Tasword especially developed to utilise the capabilities of the CPC 464 and 664 disc drives. A major new feature is a powerful mail merge facility. Tasword 464-D will only run on, and is only supplied on, disc. ▷

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Typical Tasprint output. Please note that different makes of printer produce different sized output.

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TASPRINT 48K Spectrum — cassette **£9·90**, microdrive cartridge **£11·40**

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TASPRINT QL Sinclair QL — microdrive cartridge **£19·95**

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Can be used to print AMSWORD/TASWORD 464 text files in addition to output from your own Basic programs. Drives the **Amstrad DMP-1** in addition to the printers listed above.

TASPRINT 464 Amstrad CPC 464 & 664 — cassette **£9·90**, disc **£12·90**

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Tasword 464 and Amsword owners: send your original cassette or disc (not the packaging) as proof of purchase. Your original will be returned together with Tasword 464-D on disc. **£13·90**

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continued from page 77

for drawing diagonally makes the choice of keys seem strangely scattered around the keyboard; perhaps the use of 1-8 on a clock would seem easier. In addition to the direction markers, which flash to show the direction the last line was drawn in, double pipe runs and insulated piping can be drawn and those are denoted respectively, by a flashing 'X' in the centre and a flashing 'I' just below the 'U'.

At the bottom of the screen is the draw menu which allows any one of 16 user-defined graphics to be added for room fittings such as baths, sink and tanks. There are five fittings in the Drains program. Twenty two types of pipe fittings — 21 for Drains — can also be added. An extra category in each program is available for a user-defined fitting. The Fittings option is used to change the pipe size and add T-joints.

There are three further move options included in the draw menu. Those allow you to erase part or all of the last pipe run, return to any one of the first 20 T-joints to draw a different branch, and thirdly change the rate of drawing from Slow, one pixel at a time, to Fast, one character at a time. The length of the pipe run is shown in the top left corner under the pipe size. You can be set a new run at any stage by selecting option 0 which then prompts to see if an elbow joint is to be included.

Once the drawing is finished it can be printed out onto a ZX-type printer before returning to the main menu to either list the materials used or to go through the pricing section. The pricing calculator lists the amount and type of each item used and prompts for a unit price. The cost for that item and the total cost is calculated and displayed.

One feature of the Drains program unfortunately lacking in its partner is the ability to store a diagram in memory at any stage and then to return to it later. That is the major problem with the program, apart from some poor error-trapping which may be necessary in order to fit the program into the Spectrum memory. The whole package would also benefit from a clearer manual or at the very least an option to print out each page from the program. *Mike Wright*

Publisher J Redman, Stevelon House, Slade Lane, Tarnock, Axbridge, Somerset, BS26 2SH
Price n/a **Memory** 48K
★★★



Classic Bookkeeping

IN THE August issue we reviewed an accounting package from Manx Tapes. That package was an early pre-release version and should not have been reviewed. Many improvements have been made.

Classic Book-keeping (Series 250) is a complete double-entry accounting system, including general, sales and bought ledgers and journals, for the 48K Spectrum, one microdrive and an 80 column printer. Lists of customers and suppliers, statements of accounts and trial balances are also produced.

The size of the system is approximately 200K spread over 17 programs. It is provided on three microdrive cartridges, and three further cartridges are required for holding data. Another program, entitled Series 500 and priced £69.00, is also available. It requires a second microdrive but it can handle a greater number of transactions.

An extensive manual is included, with a sample printout showing the setting up and running of the system for one month for a small manufacturing company.

On loading you must press CAPS SHIFT and CAPS LOCK to enter Capitals Mode. As all the entries are made in capitals a simple poke would have done that and given you one less item to think about. The system is run from a six-option main menu covering installing the system, making the prime entries, posting the ledgers, preparing statements, extending ledgers and annual closing entries.

The first option leads to a sub-menu to set up the control codes, the account headings, the opening balances, names and addresses and the opening aged balances. Having installed one part of the system you are returned to the main menu rather than the install menu, though a return to the install menu with an option to return to the main menu would make the system easier to use.

Data is entered as either cash received, bank payments, petty cash payments, sales journal, purchase journal and journal entries. Data for the cash received list consists of the date, a reference, customer's account, gross payment, discount, net amount and the general ledger code. Similar data is required for all other entries. All monetary entries are made in pence, avoiding the use of an awkwardly situated decimal point. An amount can also be attributed to more than one account.

The on-screen instructions refer to multiple coding being set to 10 cycles but no explanation is given there or in the manual, and you are left to find out by trial and error if that is satisfactory. At the end of a run of entries an analysis summary is printed showing the breakdown of amounts between the general ledger account codes.

Once the data is entered it needs to be sorted before it is posted to the appropriate ledger. Each set of data must be sorted individually.

Data will usually be entered at the end of a month but can be entered in batches, and then you must be careful to mark the final batch. Failure to do so causes the program to crash later by trying to read a 'write' file.

Statements of your customers' accounts can be prepared using option 4 of the main menu. That allows you to enter your trading name, telephone number and address, along with any terms you may wish to include on the invoice, before statements are printed for all accounts. Those details must be entered every month.

This is an extremely complex and comprehensive package which will produce valuable records of your business, although, perhaps because of that complexity, it is not as user-friendly as it might have been.

Mike Wright

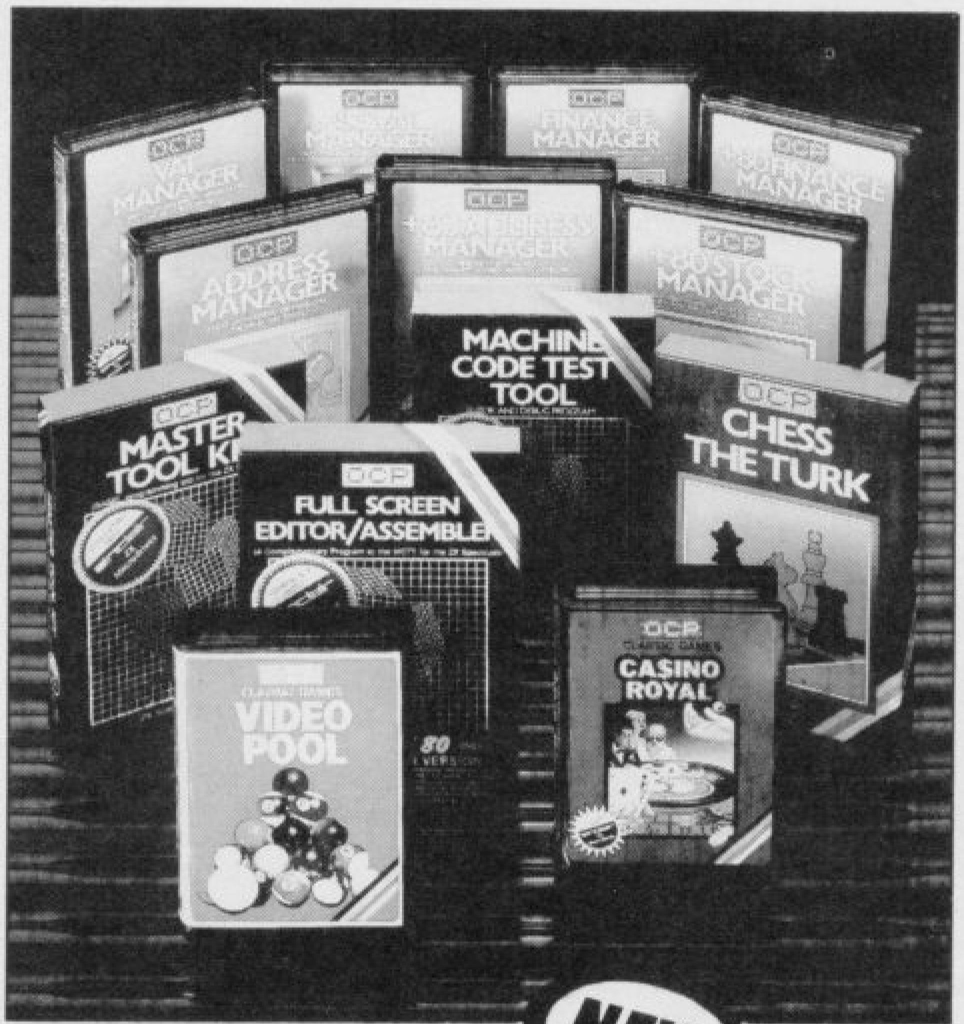
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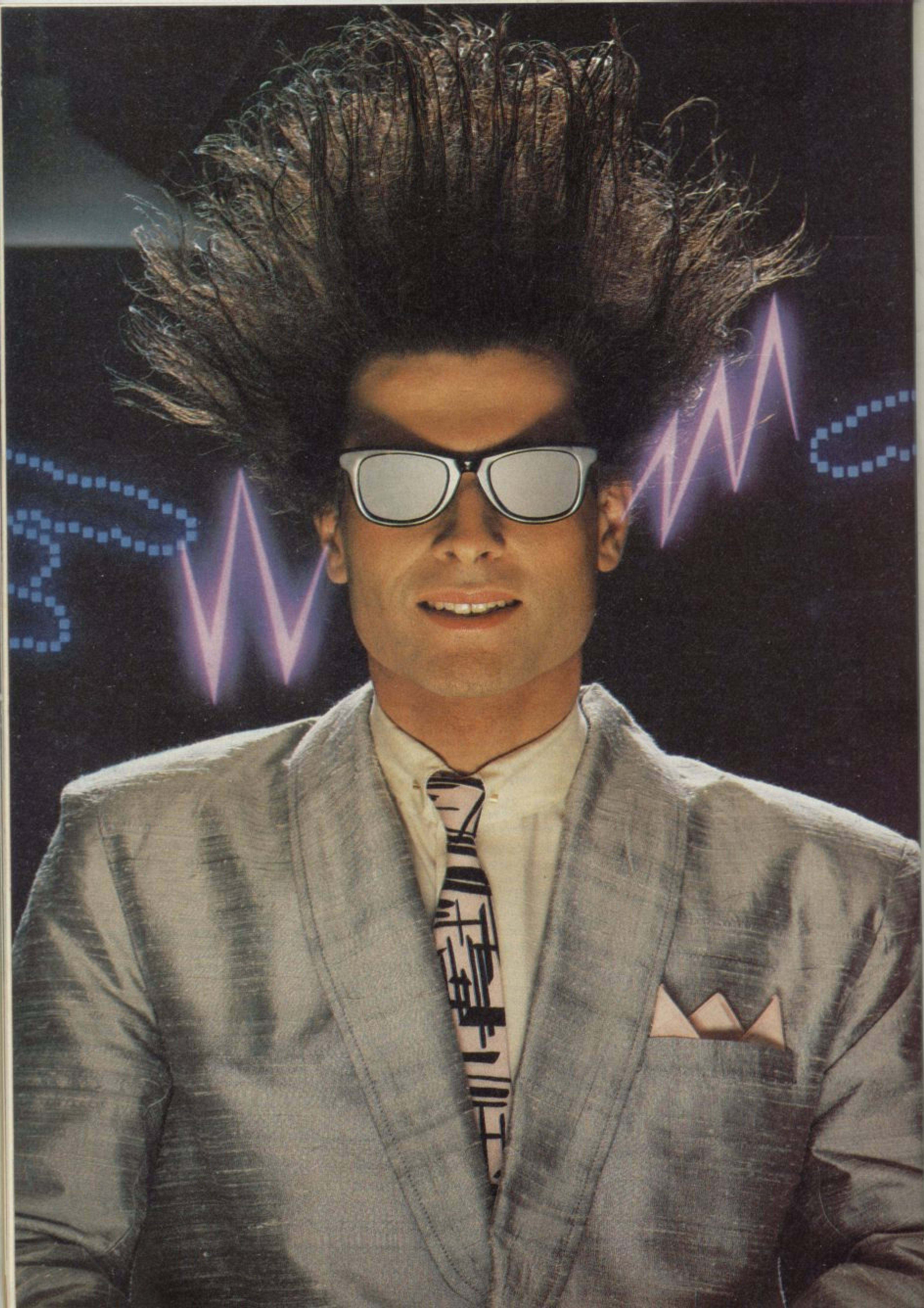
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Bournemouth. Boots, 18-20 Commercial Road. Tel: 0202 21713.
Fareham. Electronequip, 36-38 West Street. Tel: 0329 230670.
Fareham. Boots, 21 Westbury Mall. Tel: 0329 232011
Portsmouth. Micro Choice, 159 Havant Road, Drayton. Tel: 0705 327591.
Portsmouth. RDS Electrical (Portsmouth) Ltd, 157-161 Kingston Road. Tel: 0705 812478.
Portsmouth. Boots, 194/204 Commercial Road. Tel: 0705 825248.
Southampton. Boots, 23-29 Above Bar Street. Tel: 0703 333983.
Waterlooville. GB Microland, 7 Queens Parade, London Rd. Tel: 0705 259911.

HERTFORDSHIRE
Potters Bar. The Computer Shop, 197 High Street. Tel: 0707 44417.
Stevenage. DJ Computers, 11 Town Square. Tel: 0438 65501.
Watford. SRS Microsystems, 94 The Parade, High Street. Tel: 0923 26602.
Welwyn Garden City. DJ Computers. 40 Fretherne Road. Tel: 96 28444

HUMBERSIDE
Beverley. Computing World, 10 Swabys Yard, Dyer Lane. Tel: 0482 881831.
Grimsby. R.C. Johnson Ltd, 22 Friargate, River Head Centre, Tel: 0472 42031.
Hull. Boots, 48-58 Prospect Centre. Tel: 0482 22334.
Hull. Computer Centre, 26 Analby Road. Tel: 0482 26297.

ISLE OF MAN
Douglas. T.H. Colebourn, 57-61 Victoria Street. Tel: 0624 73482.

KENT
Ashford. DGH, 10 North Street. Tel: 0233 32597.
Beckenham. Supa Computers, 425 Croydon Road. Tel: 01-650 3569.
Bromley. Boots, 148-154 High Street. Tel: 01-460 6688.
Chatham. Boots, 30-34 Wilmott Square, Pentagon Centre. Tel: 0634 405471.
Gravesend. Gravesend Home Computers, 39 The Terrace. Tel: 0474 28871.
Folkstone. Boots, 24-26 Sandgate Road. Tel: 0303 54007
Maidstone. Boots, 56-62 King Street. Tel: 0622 53912.
Maidstone. Kent Micros, 52 Union Street. Tel: 0622 52784.
Rainham. Microway Computers, 39 High Street. Tel: 0634 376702.
Sevenoaks. Ernest Fielder Computers, Dorset Street. Tel: 0732 456800.
Shortlands. The Village House of Computers, 87 Beckenham Lane. Tel: 01-460 7122.
Sittingbourne. Computer Plus, 65 High Street. Tel: 0795 25677.
Tunbridge Wells. Boots, 7-11 Calverley Road. Tel: 0892 26486.
Tunbridge Wells. Modata Computer Centre, 28-30 St. Johns Road. Tel: 0892 41555.

LANCASHIRE
Blackpool. Boots, 28-38 Bank Hey St & Victoria St. Tel: 0253 22276.
Blackpool. Blackpool Computer Store, 179 Church Street. Tel: 0253 20239.
Bolton. Computer World UK. 208 Chorley Old Road. Tel: 0204 494304
Burnley. IMO Computer Centre, 39-43 Standish Street. Tel: 0282 54299.
Lancaster. Northern Lights, 89 Scotforth Road. Tel: 0524 62634.
Preston. 4Mat Computing, 67 Friargate. tel: 0772 561952.
Rochdale. Boots, 50 Market Way. Tel: 0706 53225.

LEICESTERSHIRE
Leicester. Boots, 30-36 Gallowtree Gate. Tel: 0533 21641.
Leicester. DA Computers 104 London Road. Tel: 0533 549407.
Market Harborough. Harborough Home Computers. 7 Church Street. Tel: 0858 63056.

LONDON
W1. Computers of Wigmore Street, 104 Wigmore Street. Tel: 01486 0373.
W1. Galaxy. 230 Tottenham Court Road. Tel: 01-636 6500.
W1. Sonic Foto Micro Center, 256 Tottenham Court Road, Tel: 01-580 5826.
W1. Tomorrows World Today, 27 Oxford Street. Tel: 01-439 7799.
WC1. Transam Micro Systems, 59-61 Theobalds Road. Tel: 01-405 5240.
W8. Boots, 127a Kensington High Street. Tel: 01-937 6882.
SE7. Vic Oddens Micros, 6 London Bridge Walk. Tel: 01-403 1988.
SE15. Castlehurst Ltd, 152 Rye Lane, Peckham. Tel: 01-639 2205.
EC2. Devron Computer Centre, 155 Moorgate. Tel: 01-638 3339.
N14. Logic Sales, 19 The Bourne, The Broadway, Southgate, Tel: 01-882 4942.
N22. Boots, 38-40 High Road, Wood Green. Tel: 01-881 0101.
NW4. Davinci Computer Store, 112 Brent Street, Hendon. Tel: 01-202 2272.
NW4. Boots, Brent Cross Shopping Centre. Tel: 01-202 5256/7.
NW11. Computers Inc, 86 Golders Green. Tel: 01- 209 0401.

GREATER MANCHESTER
Altrincham. Boots, 13-17 George Sreet. Tel: 061-928 4471
Hyde. C Tech Computers, 184 Market Street. Tel: 061-366 8223
Manchester. Boots, 32 Market Street. Tel: 061-832 6533.
Manchester. Mighty Micro, Sherwood Centre, 268 Wilmslow Road, Fallowfield. Tel: 061-224 8117.
Manchester. NSC Computer Shops, 29 Hanging Ditch. Tel: 061-832 2269.
Marple. Marple Computer Centre, 106 Church Lane. Tel: 061-449 9933.
Oldham. Home & Business Computers, 54 Yorkshire Street. Tel: 061-633 1608.
Oldham. Boots, 1 Town Square Shopping Centre. Tel: 061-624 2525
Stockport. National Micro Centres, 36 St Peters Gate. Tel: 061-429 8080

MERSEYSIDE
Liverpool. Hargreaves, 31-37 Warbreck Moor, Walton. Tel: 051-525 1782.
St Helens. Microman Computers, Rainford Industrial Estate, Mill Lane, Rainford. Tel: 0744 885242.
Southport. Boots, 31-39 Chapel Street. Tel: 0704 33907.
St. Helens. Boots, 8 Church Street, 24 La Grange Arcade. Tel: 0744 25488.

MIDDLESEX
Harrow. Camera Arts, 42 St. Anns Road, Tel: 01-427 5469.
Hounslow. Boots, 193-199 High Street. Tel: 01-570 0156.
Southall. Twillstar Computers Ltd, 7 Regina Road. Tel: 01-574 5271.
Teddington. Andrews, Broad Street. Tel: 01-977 4716.
Twickenham. Productive Computers Ltd, 72 Heath Road. Tel: 01-891 4991.
Uxbridge. JKL Computers, 7 Windsor Street. Tel: 0895 51815.

NORFOLK
Norwich. Adams, 125-129 King Street. Tel: 0603 22129.
Thetford. Thetford CB & Micros, 21 Guildhall Street. Tel: 0842 61645.

NOTTINGHAMSHIRE
Mansfield. Boots, 39 Four Seasons Shopping Centre, Tel: 0623 23089.
Nottingham. Boots, 11-19 Victoria Centre. Tel: 0602 470676.
Nottingham. Telstar, 280 Huntingdon Street. Tel: 0602 505585.
Worksop. Computer Graphix, 32 Bridge Street. Tel: 0909 472248.

NORTHAMPTONSHIRE
Kettering. Boots, 35 Gold Street. Tel: 0536 514675.
Northampton. Boots, 9 The Parade. Tel: 0604 22573

NORTHUMBERLAND
Morpeth. Telerents (Northern) Ltd, 31 New Gate Street. Tel: 0607 513537.

OXFORDSHIRE
Abingdon. Ivor Fields Computers, 21 Stert Street, Tel: 0235 21207.
Banbury. Computer Plus, 2 Church lane. Tel: 0295 55890.
Oxford. Science Studio, 7 Little, Clarenden Street. Tel: 0865 54022.
Oxford. Absolute Sound and Video, 19 Old High Street, Headington, Tel: 0865 65661.

SCOTLAND
Aberdeen. Boots, 133-141 Union Street. Tel: 0224 585349.
Dundee. Boots, 49-53 High Street, Tel: 0382 21756.
Edinburgh. Boots, 101-103 Princes Street. Tel: 031-225 8331.
Edinburgh. Microworld Computer Group, 12 Leven Street. Tel: 031 228 1111
Edinburgh. Edinburgh Computers, 51-57 Lothian Road. Tel: 031 229 4418.
Edinburgh. Silicon Centre, 7 Antigua Street. Tel: 031 557 4546.
Glasgow. Boots, 200 Sauchiehall Street. Tel: 041 332 1925.
Glasgow. Microworld Computer Group, 11 Bath Street. Tel: 041 332 1116.
Glasgow. Boots, Union Street and Argyle Street. Tel: 041 248 7387.
Glasgow. Tom Dixon Cameras, 15-17 Queen Street. Tel: 041-204 0826.
Glasgow. Commscot Ltd, 30 Gordon Street. Tel: 041 226 4878.
East Kilbride. Boots, 33-37 The Plaza. Tel: 035 52 20629.
Falkirk. Boots, 79-91 High Street. Tel: 0324 20535.
Hamilton. Tom Dixon Cameras, 8 Cadzou Street. Tel: 0698 283193.
Peterhead. North East Computers. 1 Ellis Street. Tel: 0779 79900.

SHROPSHIRE
Shrewsbury. Computerama, 13 Castlegate. Tel: 0743 60528.
Telford. Computer Village, 2/3 Hazeldine House, Central Square. Tel: 0952 506771.
Telford. Telford Electronics, 38 Mall 4. Tel: 0952 504911.

SOMERSET
Taunton. Boots, 64-65 High Street. Tel: 0823 76061.

STAFFORDSHIRE
Newcastle-under-Lyme. Computer Cabin, 24 The Parade, Silverdale. Tel: 0782 636911.
Stoke on Trent. Town Computer Store, 30 Town Road, Hanley. Tel: 0782 287540.
Stoke on Trent. Boots, 3-5 Market Square, Hanley. Tel: 0782 23271.

SUFFOLK
Bury St. Edmunds. Boots, 11-13 Cornhill. Tel: 0284 701516.
Bury St. Edmunds. The Suffolk Computer Centre, 1-3 Garland Street. Tel: 0284 705503.
Ipswich. Computer Magic, 24 Crown Street. Tel: 0473 50965.

SURREY
South Croydon. Concise Computer Consultants. 1 Carlton Road. Tel: 01-681 6842.
Croydon. The Vision Store, 53-59 High Street. Tel: 01-686 6362.
Croydon. Boots, The Mall, 12-18 Whitgift Centre. Tel: 01-688 6021.
Epsom. The Micro Workshop, 12 Station Approach. Tel: 0372 721533.
Guildford. Guildford Computer Centre, 5 The Quadrant, Bridge Street. Tel: 0483 578848.
Wallington. Surrey Micro Systems, 53 Woodcote Road. Tel: 01-647 5636.
Woking. Harpers, 71-73 Commercial Way. Tel: 0486 225657.

SUSSEX
Brighton. Boots, 129 North Street. Tel: 0273 27088.
Brighton. Gamer, 71 East Street. Tel: 0273 728681.
Bognor Regis. Bits & Bytes, High Street. Tel: 0243 867143.
Eastbourne. Boots, 15 Eastbourne Arndale Centre. Tel: 0323 27742.
Horsham. Boots, 1 Swan Walk, Tel: 0403 53053.
Horsham. Orchard Computer Centre, 34 East Street. Tel: 0403 64884.
Worthing. Boots, 48-52 Montague Street. Tel: 0903 207106.

TYNE & WEAR
Newcastle-upon-Tyne. Boots, Eldon Square. Tel: 0632 329844.
Newcastle-upon-Tyne. RE Computing, Parkview House, Front Street, 4 Lane Ends. Tel: 091 2701740.
Sunderland. Business Micro Communications Ltd, Refuge Assurance Buildings, Saint Thomas Street, West Sunniside. Tel: 0783 654916.

WALES
Aberdare. Inkey Computer Services, 70 Mill Street, The Square, Trecynon. Tel: 0685 881828.
Aberystwyth. Aberdata at Galloways, 23 Pier Street. Tel: 0970 615522.
Cardiff. Boots, 36 Queens Street & 105 Frederick Street. Tel: 0222 31291.
Cardiff. The Computer Shop, 41 The Hayes. Tel: 0222 26666.
Cardiff. Cardiff Microcomputers, 46 Charles Street. Tel: 0222 373072.
Newport. Gwent Computers, 92 Chepstow Road. Tel: 0633 841760.
Newport. Boots, 155-156 Commercial Street. Tel: 0633 51212.
Swansea. Boots, 17 St. Marys Arcade, The Quadrant Shopping Centre. Tel: 0792 43461.
Swansea. The Micro Store, 35-36 Singleton Street. Tel: 0792 46980.

WARWICKSHIRE
Coventry. Boots, 38-42 Corporation Street. Tel: 0203 26561.
Leamington Spa. Boots, 31 Parade. Tel: 0926 24945.
Leamington Spa. Leamington Hobby Centre 121 Regent Street. Tel: 0926 29211.
Nuneaton. Micro City, 1a Queens Road. Tel: 0203 382049.
Rugby. O.E.M., 9-11 Regent Street. Tel: 0788 70522.

WEST MIDLANDS
Birmingham. Boots, City Centre House, 16-17 New Street. Tel: 021-643 7582.
Dudley. Central Computers, 35 Churchill Precinct. Tel: 0384 238169.
Stourbridge. Walters Computer Systems. 12 Hagley Road. Tel: 0384 370811.
Walsall. New Horizon, 1 Goodall Street. Tel: 0922 24821.

WILTSHIRE
Trowbridge. West Wiltshire Micros, Whiteheart Yard. Tel: 02214 67259.

YORKSHIRE
Bradford. Boots, 11 Darley Street. Tel: 0274 390891.
Doncaster. Boots, 13-15 French Gate, Tel: 0302 62238.
Barnsley. Boots, 34-40 Cheapside. Tel: 0226 82616.
Huddersfield. Micro World Computers, 1006-1010 Manchester Road, Linthwaite. Tel: 0484 846117.
Huddersfield. Boots, 22 King Street. Tel: 0484 21756.
Leeds. Boots, 19 Albion Arcade, Bond Street Centre. Tel: 0532 33551.
Leeds. Micro Power, Northwood House, North Street. Tel: 0532 458800.
Sheffield. PIP Micro Communications, 9 Taptown Crescent, Broomhill. Tel: 0742 661096.
Sheffield. Boots, 4-6 High Street. Tel: 0742 78333.
Wakefield. Boots, 26-28 Upper Kirkgate. Tel: 0924 376181.
York. York Computer Centre, 7 Stonegate Arcade. Tel: 0904 641862.



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Micronet 800, 8 Herbal Hill, London EC1.

PROGRAM PRINTOUT

GRAPHICS INSTRUCTIONS

IN GENERAL, graphics abbreviations are enclosed in brackets, which should not be entered. A string of the same graphics character is represented in the form (3*A) which would be entered as AAA, where A is the graphics character. A space, where it is important to have the correct number of spaces, is indicated by (sp). Spaces in text will not normally be indicated. Where several graphics characters are used, they are separated by commas, which should not be entered. With Spectrum and QL listings the letter l has a flat top and the numeral 1 has a sloping top.

The above applies to all Sinclair machines. The following instructions are for specific machines.

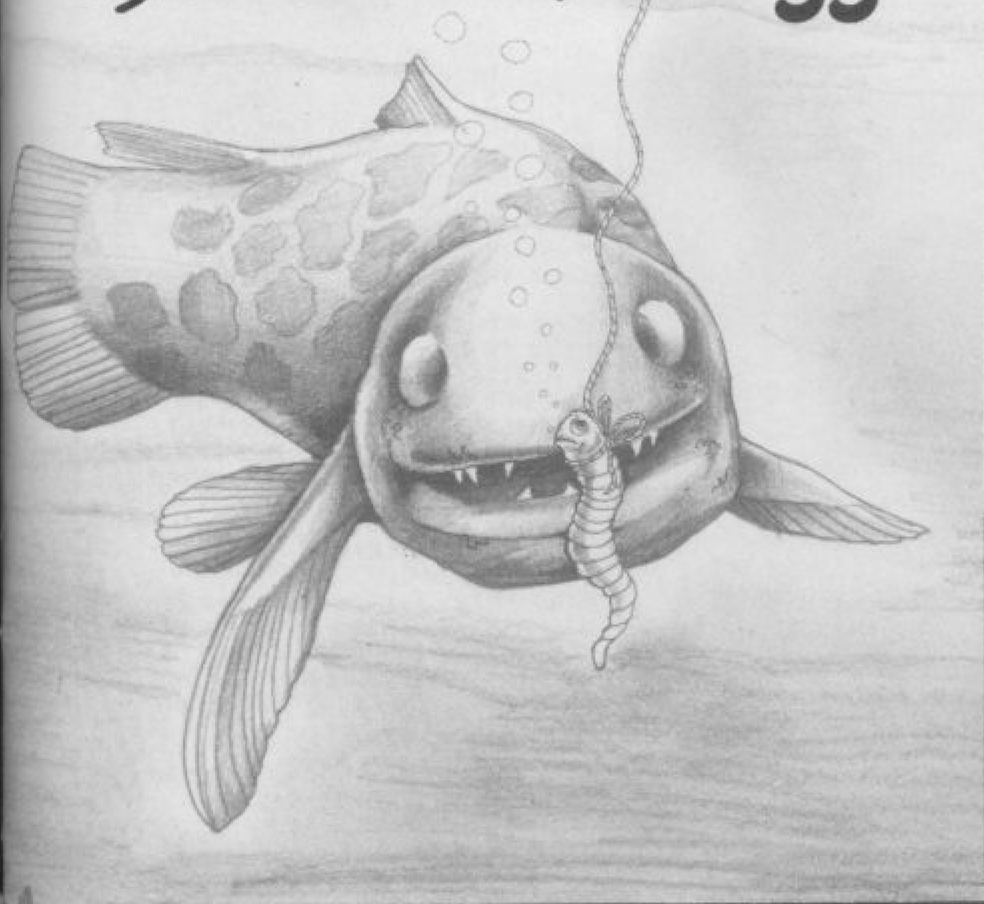
ZX-81: ZX-81 listings are generally reproduced as they appear when you enter them, spaces and all. Where extensive graphics are used, REM statements will be inserted to provide a guide to the position of each character.

Spectrum: User-defined graphics are represented by underlined letters, without brackets. Type the appropriate letter while in graphics mode. The underline does not appear on the screen. Inverse characters have the letter i before them, e.g. iZ, iA, iP. Block graphic characters are indicated by g followed by the number of the appropriate key: g4 would mean the block graphics on key 4, ig4 the inverse of that graphic.

Control codes are indicated by cc before the character, and are obtained by pressing CAPS SHIFT while in extended mode. They do not appear on the screen but may change the colour of the cursor and will affect what is printed after them: cc3,i* would thus have the effect of printing an inverse asterisk in red.

QL: User-defined graphics on the QL are indicated by a description of the keys pressed to obtain them, underlined and in brackets. Thus (CTRL + 9) means press CTRL and 9 together. The same applies for unusual characters within the QL character set, which our printer is unable to reproduce.

The Golden Maggot



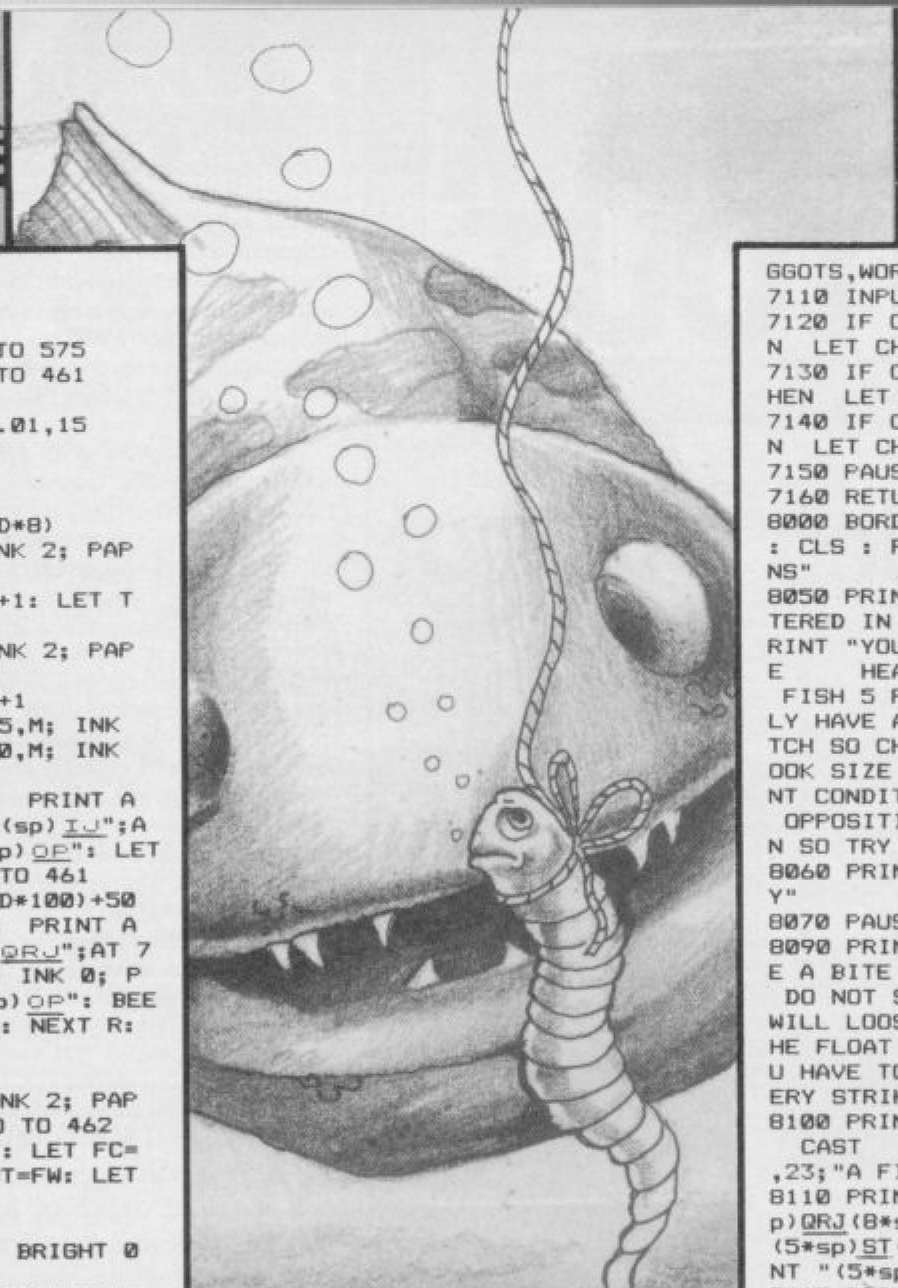
WIN THE coveted golden maggot trophy in P Todhunter's fishing simulation. Choose bait and depth of hook according to weather, and then sit back and wait for a bite. Use key 1 to strike the fish, Q for a short cast and A for a long cast.

The Golden Maggot runs on a 48K Spectrum or Spectrum Plus, and experienced programmers should find it easy to include more details of baits and fish.

The program uses our special abbreviations for graphics characters, so please read the instructions above.

```
  5 POKE 23658,58
  10 REM *THE GOLDEN MAGGOT*
  20 FOR N=USR "A" TO USR "U"+7:
 READ A: POKE N,A: NEXT N
  21 LET MATCH=1
  22 BORDER 7: PAPER 7: BRIGHT 0
 : CLS
  25 PRINT AT 0,7;"THE GOLDEN MA
GGOT";AT 1,8;"FISHING CONTEST"
  30 PRINT AT 3,4;"WRITTEN BY P.
TODHUNTER"
  40 PRINT AT 6,7;"1)....INSTRUC
TIONS"
  45 PRINT AT 8,7;"2)....START F
ISHING"
  50 IF INKEY$="1" THEN  LET CH=
0: GO SUB 8000
  60 IF INKEY$="2" THEN  GO TO 9
0
  70 GO TO 25
  90 BEEP .01,30: BEEP .01,40: B
EEP .01,30: BEEP .01,40: BEEP .0
1,30: BEEP .01,40: BEEP .05,50:
INPUT "ENTER NAME (MAX.12) ";N$:
 IF LEN N$>12 OR LEN N$<0 THEN
GO TO 90
 100 BORDER 7: PAPER 7: BRIGHT 0
 : CLS
 105 GO SUB INT (RND*3+5)*1000+(
cc5)
 110 BORDER 0: PAPER 5: BRIGHT 1
 : CLS
 120 FOR Y=0 TO 31
 130 INK 7: PRINT AT 0,Y;"(ig8)"
;AT 1,Y;"(ig8)";AT 2,Y;"(ig8)";A
T 3,Y;"(ig8)";AT 4,Y;"(ig8)"
 140 INK 4: PRINT AT 5,Y;"(ig8)"
;AT 6,Y;"(ig8)";AT 7,Y;"(ig8)";A
T 8,Y;"(ig8)";AT 9,Y;"(ig8)"
 150 PRINT AT 10,Y; INK 6;"(ig8)
"
 155 NEXT Y
 160 PRINT AT 9,2; INK 0; PAPER
4;"AB";AT 10,2; INK 0; PAPER 6;"
CD"
 170 PRINT AT 9,6; INK 0; PAPER
4;"AB";AT 10,6; INK 0; PAPER 6;"
CD"
 180 PRINT AT 9,16; INK 0; PAPER
 4;"AB";AT 10,16; INK 0; PAPER 6
;"CD"
 190 PRINT AT 9,21; INK 0; PAPER
 4;"AB";AT 10,21; INK 0; PAPER 6
;"CD"
 210 PRINT AT 9,30; INK 0; PAPER
 4;"AB";AT 10,30; INK 0; PAPER 6
;"CD"
 230 PRINT AT 11,4; INK 4; PAPER
 5;"EFEF"
 240 PRINT AT 12,5; INK 4; PAPER
 5;"EFEF"
 250 PRINT AT 13,3; INK 4; PAPER
 5;"EF"
 260 PRINT AT 11,13; INK 4; PAPE
R 5;"EF"
 265 PRINT AT 12,15; INK 4; PAPE
R 5;"EF"; INK 0; PAPER 5;" AB"
 270 PRINT AT 13,16; INK 4; PAPE
R 5;"EF"; INK 0; PAPER 5;"CD"
 310 PRINT AT 14,18; INK 4; PAPE
R 5;"EF"
 320 PRINT AT 12,20; INK 4; PAPE
R 5;"EF";AT 13,21;"EF";AT 12,23;
 INK 0; PAPER 5;"AB";AT 13,23; I
NK 0; PAPER 5;"CD"
 330 PRINT AT 11,27; INK 4; PAPE
R 5;"EFEF";AT 12,28;"EF"
 350 LET FC=0
 360 LET P=0
 370 LET WT=0
 400 LET M=INT (RND*28)
 430 FOR Q=1 TO 15
 440 BEEP .01,10: BEEP .01,15
 442 NEXT Q
 443 INK 0
 455 LET CAST=0
 460 LET T=0
 461 IF CAST=0 THEN  PRINT AT 6,
M; PAPER 4;"QRJ";AT 7,M;"(sp)ST"
;AT 8,M;"(sp)OP"
 500 PRINT AT 1,1; PAPER 7;"FISH
 CAUGHT=";FC
 510 PRINT AT 2,1; PAPER 7;"POIN
TS=";P
 520 PRINT AT 3,1; PAPER 7;"MATC
H=";MATCH
 525 PRINT AT 1,17; PAPER 7;"WEI
GHT OF";AT 2,17;"LAST FISH";AT 3
,19;WT;" LB"
 530 IF INKEY$="Q" AND CAST=0 TH
EN  PRINT AT 6,M; PAPER 4;"(sp)I
J";AT 7,M; PAPER 4;"KLM";AT 8,M;
 PAPER 4;"NOP": PAUSE 5: PRINT A
T 15,M; INK 2; PAPER 5;"G": LET
CAST=15
 535 IF INKEY$="A" AND CAST=0 TH
EN  PRINT AT 6,M; PAPER 4;"(sp)I
J";AT 7,M; PAPER 4;"KLM";AT 8,M;
 PAPER 4;"NOP": PAUSE 10: PRINT
AT 20,M; INK 2; PAPER 5;"G": LET
 CAST=20
 540 LET FISH=INT (RND*40-CH)
 550 IF FISH=1 AND CAST=15 OR FI
SH=1 AND CAST=20 THEN  LET T=T+1
: GO SUB 2000
 560 IF INKEY$="1" AND FISH<>1 T
HEN  PRINT AT 15,M; PAPER 5; INK
 5;"(ig8)": PRINT AT 20,M; PAPER
 5; INK 5;"(ig8)": LET CAST=0: L
```

continued on page 86



continued from page 85

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ET T=T+1: GO TO 461
 570 LET T=T+1
 572 IF T>600 THEN  GO TO 575
 574 IF T<600 THEN  GO TO 461
 578 FOR F=1 TO 10
 580 BEEP .01,10: BEEP .01,15
 585 NEXT F
 587 GO SUB 3000
 590 GO TO 100
2000 FOR B=1 TO INT (RND*8)
2005 PRINT AT CAST,M; INK 2; PAP
ER 5;"G"
2006 PAUSE INT (RND*30)+1: LET T
=T+1
2007 PRINT AT CAST,M; INK 2; PAP
ER 5;"H"
2008 PAUSE INT (RND*30)+1
2009 NEXT B: PRINT AT 15,M; INK
5; PAPER 5;"(ig8)";AT 20,M; INK
5;"(ig8)"
2010 IF INKEY$="1" THEN  PRINT A
T 6,M; INK 0; PAPER 4;"(sp)IJ";A
T 7,M;"KLM";AT 8,M;"(sp)OP": LET
 CAST=0: LET T=T+1: GO TO 461
2020 FOR X=1 TO INT (RND*100)+50
2040 IF INKEY$="1" THEN  PRINT A
T 6,M; INK 0; PAPER 4;"QRJ";AT 7
,M; INK 7; PAPER 4;"U"; INK 0; P
APER 4;"ST";AT 8,M;"(sp)OP": BEE
P .01,40: FOR R=1 TO 10: NEXT R:
 GO TO 2055
2050 NEXT X
2052 PRINT AT CAST,M; INK 2; PAP
ER 5;"G": LET T=T+1: GO TO 462
2055 LET FW=INT (RND*6): LET FC=
FC+1: LET P=P+FW: LET WT=FW: LET
 CAST=0: LET T=T+1
2060 RETURN
3000 BORDER 7: PAPER 7: BRIGHT 0
: CLS
3010 PRINT AT 1,9;"GOLDEN MAGGOT
";AT 2,8;"FISHING CONTEST"
3020 PRINT AT 3,10;"MATCH No.";M
ATCH
3025 PLOT 60,170: DRAW 130,0: DR
AW 0,-30: DRAW -130,0: DRAW 0,30
3030 PRINT AT 2,24; INK 4;"EF";
INK 0;"CD"; INK 4;"EF";AT 3,25;"
EFEF";AT 4,24; INK 2;"G": PRINT
AT 1,26; INK 0;"AB": PRINT AT 5,
27; INK 4;"EF"
3040 PRINT AT 6,7;"(3*sp)NAME(7*
sp)PTS."
3050 PLOT 50,129: DRAW 150,0: DR
AW 0,-91: DRAW -150,0: DRAW 0,91
3055 FOR I=118 TO 35 STEP -16
3060 PLOT 50,I: DRAW 150,0
3065 NEXT I
3070 PLOT 165,129: DRAW 0,-91
3080 PRINT AT 8,7;"JOHN ROACH";A
T 10,7;"PAUL RUDD";AT 12,7;"DAVI
D BREAM";AT 14,7;"NIGEL PIKE";AT
 16,7;N$
3083 FOR L=8 TO 14 STEP 2
3084 LET K1=INT (RND*40)
3085 PRINT AT L,22;K1;
3086 NEXT L
3088 PRINT AT 16,22;P
3100 PAUSE 0: LET MATCH=MATCH+1:
 GO TO 22
5000 CLS : PRINT "WEATHER:-SUNNY
"
5010 GO SUB 8500
5015 IF A<(DP/3) THEN  LET CH=CH
+0
5020 IF A>(DP/3) AND A<(DP/3*2)
THEN  LET CH=CH+1
5030 IF A>(DP/3*2) THEN  LET CH=
CH+2
5040 PRINT "WHAT SIZE HOOK?(S,M,
L)"
5050 INPUT B$
5060 IF B$="S" THEN  LET CH=CH+0
5065 IF B$="M" THEN  LET CH=CH+1
5070 IF B$="L" THEN  LET CH=CH+1
5075 PRINT "WHICH BAIT?-BREAD.MA
GGOTS,WORMS"
5080 INPUT C$
5090 IF C$="BREAD" OR C$="B" THE
N  LET CH=CH+2
5100 IF C$="MAGGOTS" OR C$="M" T
HEN  LET CH=CH+0
5110 IF C$="WORMS" OR C$="W" THE
N  LET CH=CH+1
5120 PAUSE 100
5130 RETURN
6000 CLS : PRINT "WEATHER:-CLOUD
Y"
6010 GO SUB 8500
6020 IF A<(DP/3) THEN  LET CH=CH
+1
6030 IF A>(DP/3) AND A<(DP/3*2)
THEN  LET CH=CH+3
6040 IF A>(DP/3*2) THEN  LET CH=
CH+1
6050 PRINT "WHAT SIZE HOOK?(S,M,
L)"
6060 INPUT B$
6070 IF B$="L" THEN  LET CH=CH+1
6080 IF B$="M" THEN  LET CH=CH+1
6090 IF B$="S" THEN  LET CH=CH+2
6100 PRINT "WHICH BAIT?-BREAD,MA
GGOTS,WORMS"
6110 INPUT C$
6120 IF C$="BREAD" OR C$="B" THE
N  LET CH=CH+1
6130 IF C$="MAGGOTS" OR C$="M" T
HEN  LET CH=CH+2
6140 IF C$="WORMS" OR C$="W" THE
N  LET CH=CH+1
6150 PAUSE 100
6160 RETURN
7000 PRINT "WEATHER:-RAINING"
7010 GO SUB 8500
7020 IF A<(DP/3) THEN  LET CH=CH
+0
7030 IF A>(DP/3) AND A<(DP/3*2)
THEN  LET CH=CH+1
7040 IF A>(DP/3*2) THEN  LET CH=
CH+1
7050 PRINT "WHAT SIZE HOOK?(S,M,
L)"
7060 INPUT B$
7070 IF B$="L" THEN  LET CH=CH+3
7080 IF B$="M" THEN  LET CH=CH+1
7090 IF B$="S" THEN  LET CH=CH+1
7100 PRINT "WHICH BAIT?-BREAD,MA
GGOTS,WORMS"
7110 INPUT C$
7120 IF C$="BREAD" OR C$="B" THE
N  LET CH=CH+1
7130 IF C$="MAGGOTS" OR C$="M" T
HEN  LET CH=CH+1
7140 IF C$="WORMS" OR C$="W" THE
N  LET CH=CH+3
7150 PAUSE 100
7160 RETURN
8000 BORDER 7: PAPER 7: BRIGHT 0
: CLS : PRINT AT 1,9;"INSTRUCTIO
NS"
8050 PRINT : PRINT " YOU HAVE EN
TERED IN A FISHING  CONTEST.": P
RINT "YOU GET MORE POINTS FOR TH
E      HEAVIER THE FISH eg/ A 5LB
 FISH 5 POINTS.": PRINT " YOU ON
LY HAVE A CERTAIN TIME INEACH MA
TCH SO CHOOSE THE RIGHT  DEPTH,H
OOK SIZE AND BAIT FOR THEDIFFERE
NT CONDITIONS.": PRINT "YOU HAVE
 OPPOSITION FROM OTHER  FISHERME
N SO TRY YOU BEST"
8060 PRINT AT 21,8;"PRESS ANY KE
Y"
8070 PAUSE 0: BEEP .01,40: CLS
8090 PRINT : PRINT "WHEN YOU HAV
E A BITE YOUR FLOAT WILL BOB.BUT
 DO NOT STRIKE TOO  SOON OR YOU
WILL LOOSE THE FISH.WAIT UNTIL T
HE FLOAT IS FULLY   SUBMERGED.YO
U HAVE TO CAST BACK OUT AFTER EV
ERY STRIKE SO DON'T FORGET!"
8100 PRINT : PRINT "    STRIKE
  CAST      CAUGHT ": PRINT AT 10
,23;"A FISH"
8110 PRINT : PRINT : PRINT "(4*s
p)QRJ(8*sp)IJ(8*sp)QRJ": PRINT "
(5*sp)ST(7*sp)KLM(8*sp)UST": PRI
NT "(5*sp)OP(7*sp)NOP(9*sp)OP"
8115 PRINT AT 21,8;"PRESS ANY KE
Y"
8120 PAUSE 0
8130 BEEP .01,40: CLS : RETURN
8500 LET DP=INT (RND*10)+5
8510 PRINT "THE WATER IS ";DP;"
FEET DEEP"
8520 PRINT "WHAT DEPTH ARE YOU S
ETTING YOUR FLOAT?"
8525 INPUT A
8530 IF A<0 OR A>DP THEN  GO TO
8520
8540 PRINT "YOU HAVE SET YOUR FL
OAT AT ";A;" FT"
8550 PRINT "IS THIS CORRECT?(Y/N
)"
8560 INPUT A$
8570 IF A$="N" THEN  GO TO 8510
8575 LET CH=0
8580 RETURN
9000 DATA 4,4,66,66,34,33,33,33
9010 DATA 0,8,20,20,17,17,34,34
9020 DATA 33,145,149,149,85,80,6
6,2
9030 DATA 34,40,68,68,84,80,16,1
6
9040 DATA 0,0,3,31,62,62,31,12
9050 DATA 0,0,224,240,254,252,11
2,0
9060 DATA 8,8,8,28,28,0,0,0
9070 DATA 0,8,8,8,28,0,0,0
9080 DATA 0,0,1,0,0,1,1,3
9090 DATA 248,248,232,168,136,25
4,14,7
9100 DATA 0,0,0,0,0,0,0,3
9110 DATA 3,3,4,11,14,51,196,8
9120 DATA 15,55,207,62,252,212,6
8,206
9130 DATA 12,48,192,0,0,0,0,0
9140 DATA 17,34,58,59,59,123,247
,15
9150 DATA 26,50,116,212,204,202,
145,16
9160 DATA 0,0,0,0,0,0,126,129
9170 DATA 0,0,1,0,0,1,1,131
9180 DATA 99,27,6,7,7,3,4,8
9190 DATA 7,7,127,254,228,92,68,
206
9200 DATA 0,0,64,224,224,224,64,
224
```



PLAY THE DEVIL for your soul in **Devil's Disks** by D Cunningham of Rhyl in Clwyd. The two-player strategy game uses an unusual method of movement. You must get your four disks across the board by moving into coloured squares, but you can only move onto a square of the same colour as the three in front of your opponent's pieces. Each move you make alters the possibilities for the other player, so great care and skill is required to win.

Devil's Disks runs on a 48K Spectrum or Spectrum Plus, and with a randomly coloured board every game is different.

The program uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the listing.

```
  10 GO SUB 5000
  20 GO SUB 6500
  30 GO SUB 500
  40 LET SCO1=0: LET SCO2=0
  50 LET LIV1=0: LET LIV2=0
 120 FOR x=2 TO 18 STEP 2
 130 FOR y=1 TO 30 STEP 2
 140 LET a=INT (RND*4)+2
 150 PRINT AT x,y; BRIGHT 0; PAP
ER a; INK 0;"(2*sp)";AT x+1,y; P
APER a; INK 0;"(2*sp)": NEXT y:
NEXT x
 160 DIM c(8): FOR x=1 TO 8: LET
 c(x)=ATTR (h(x),p(x)): NEXT x
 170 GO TO 1000
 500 BRIGHT 1: PAPER 0: INK 0: B
ORDER 1: CLS
 510 DIM p(8)
 520 FOR x=1 TO 8:
 530 LET p(x)=INT (RND*14)+2: LE
T p(x)=p(x)*2: IF p(x)=30 THEN
GO TO 530
 540 FOR y=1 TO x
 550 IF p(x)=p(y) AND x<>y THEN
 GO TO 530
 560 NEXT y: NEXT x
 570 DIM h(8): FOR x=1 TO 4: LET
 h(x)=2: NEXT x: FOR x=5 TO 8: L
ET h(x)=19: NEXT x
 580 RETURN
1000 BRIGHT 0: FOR x=1 TO 4: PRI
NT AT h(x),p(x)-1; PAPER (c(x)/8
); INK 1;"EF";AT h(x)+1,p(x)-1;
PAPER (c(x)/8); INK 1;"GH": NEXT
 x
1010 BRIGHT 0: FOR x=5 TO 8: PRI
NT AT h(x),p(x)-1; PAPER (c(x)/8
); INK 7;"CD";AT h(x)-1,p(x)-1;
PAPER (c(x)/8); INK 7;"AB": NEXT
 x
1020 LET a=10: LET b=11
1200 REM player 1's turn ↑
1210 PRINT  INK 6; PAPER 1; BRIG
HT 0;AT 21,0;"PLAYER 1'S TURN(17
*sp)";AT 0,0;"(32*sp)"
1220 PRINT  INK 5; PAPER 0;AT 20
,b;"IJ";AT 1,b;"KL"
1230 PRINT  INK 5; PAPER 0;AT a,
0;"N";AT a+1,0;"M";AT a,31;"O";A
T a+1,31;"P"
1235 LET q=a: LET w=b
1240 LET a=a+(2 AND INKEY$="6" A
ND a<18)-(2 AND INKEY$="7" AND a
>2)
1250 LET b=b+(2 AND INKEY$="8" A
ND b<28)-(2 AND INKEY$="5" AND b
>2)
1260 IF a<>q THEN  PRINT  INK 7;
 PAPER 0;AT q,0;"(sp)";AT q+1,0;
"(sp)";AT q,31;"(sp)";AT q+1,31;
"(sp)": BEEP .005,35
1270 IF w<>b THEN  PRINT ,INK 7;
 PAPER 0;AT 20,w;"(2*sp)";AT 1,w
;"(2*sp)": BEEP .005,15
1275 IF INKEY$="1" THEN  BEEP .1
,0: GO TO 1500
1277 IF INKEY$="Q" OR INKEY$="q"
 THEN  GO TO 4000
1280 IF INKEY$="0" AND (ATTR (a,
b)/8)<>INT (ATTR (a,b)/8) THEN
GO TO 1300
1290 GO TO 1220
1300 FOR x=5 TO 8: IF (a+1)=h(x)
 AND (b+1)=p(x) THEN  GO TO 1330
1310 NEXT x
1320 GO TO 1240
1330 LET DSK=X
1340 LET COL=ATTR (H(DSK)-2,P(DS
K))
1350 FOR X=1 TO 4
1360 IF ((ATTR (H(X)+2,P(X)-2)=C
OL) OR (ATTR (H(X)+2,P(X))=COL)
OR (ATTR (H(X)+2,P(X)+2)=COL)) A
ND H(X)>1 THEN  GO TO 1390
1370 NEXT X
1380 PRINT  INK 0; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"(2*sp)";
AT H(DSK)-1,P(DSK)-1;"(2*sp)"
1385 LET H(DSK)=19
1388 PRINT  INK 7; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"CD";AT H
(DSK)-1,P(DSK)-1;"AB"
1389 FOR X=40 TO 1 STEP -2: BEEP
 .01,X: NEXT X: GO TO 1500
1390 BEEP .01,55: BEEP .01,50: P
RINT  INK 0; PAPER (C(DSK)/8);AT
 H(DSK),P(DSK)-1;"(2*sp)";AT H(D
SK)-1,P(DSK)-1;"(2*sp)"
1400 LET C(DSK)=COL: LET SCO1=SC
O1+10
1410 LET H(DSK)=H(DSK)-2
1420 PRINT  INK 7; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"CD";AT H
(DSK)-1,P(DSK)-1;"AB"
1430 IF H(DSK)<>3 THEN  GO TO 14
40
1432 PRINT  INK 0; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"(2*sp)";
AT H(DSK)-1,P(DSK)-1;"(2*sp)": L
ET P(DSK)=0: LET H(DSK)=0: LET L
```

continued on page 88



continued from page 87

```
IV1=LIV1+1: LET SCO1=SCO1+50: FO
R X=1 TO 20: BEEP .005,X*3: NEXT
 X
1435 IF LIV1=4 THEN  GO TO 4500:
 REM  ALL ROUND DISKS ACROSS
1440 IF RND>RND THEN  GO TO 1500
1450 LET GND=INT (RND*8)+2: LET
GND=GND*2: LET LEV=INT (RND*14)+
1: LET LEV=LEV*2
1470 FOR X=1 TO 8: IF LEV+2=P(X)
 THEN  GO TO 1500
1480 NEXT X
1490 PRINT  INK 7; BRIGHT 1;AT G
ND,LEV+1;"QS";AT GND+1,LEV+1;"RT
"
1500 REM PLAYER 2'S TURN
1510 PRINT  INK 6; PAPER 1; BRIG
HT 0;AT 0,0;"PLAYER 2'S TURN(17*
sp)";AT 21,0;"(32*sp)"
1520 PRINT  INK 5; PAPER 0;AT 20
,b;"IJ";AT 1,b;"KL"
1530 PRINT  INK 5; PAPER 0;AT a,
0;"N";AT a+1,0;"M";AT a,31;"O";A
T a+1,31;"P"
1535 LET q=a: LET w=b
1540 LET a=a+(2 AND INKEY$="6" A
ND a<18)-(2 AND INKEY$="7" AND a
>2)
1550 LET b=b+(2 AND INKEY$="8" A
ND b<28)-(2 AND INKEY$="5" AND b
>2)
1560 IF a<>q THEN  PRINT  INK 7;
 PAPER 0;AT q,0;"(sp)";AT q+1,0;
"(sp)";AT q,31;"(sp)";AT q+1,31;
"(sp)": BEEP .005,35
1570 IF w<>b THEN  PRINT  INK 7;
 PAPER 0;AT 20,w;"(2*sp)";AT 1,w
;"(2*sp)": BEEP .005,15
1575 IF INKEY$="2" THEN  BEEP .1
,0: GO TO 1200
1577 IF INKEY$="Q" OR INKEY$="q"
 THEN  GO TO 4000
1580 IF INKEY$="0" AND (ATTR (a,
b)/8)<>INT (ATTR (a,b)/8) THEN
GO TO 1600
1590 GO TO 1520
1600 FOR x=1 TO 4: IF a=h(x) AND
 (b+1)=p(x) THEN  GO TO 1630
1610 NEXT X
1620 GO TO 1520
1630 LET DSK=X
1640 LET COL=ATTR (H(DSK)+2,P(DS
K))
1650 FOR X=5 TO 8
1660 IF ((ATTR (H(X)-2,P(X)-2)=C
OL) OR (ATTR (H(X)-2,P(X))=COL)
OR (ATTR (H(X)-2,P(X)+2)=COL)) A
ND H(X)>1 THEN  GO TO 1690
1670 NEXT X
1680 PRINT  PAPER C(DSK)/8;AT H(
DSK)+1,P(DSK)-1;"(2*sp)";AT H(DS
K),P(DSK)-1;"(2*sp)"
1685 LET h(dsk)=2
1688 PRINT  INK 1; PAPER C(DSK)/
8;AT H(DSK)+1,P(DSK)-1;"GH";AT H
(DSK),P(DSK)-1;"EF"
1689 FOR X=39 TO 0 STEP -2: BEEP
 .01,X: NEXT X: GO TO 1200
1690 BEEP .01,40: BEEP .01,45: P
RINT  PAPER C(DSK)/8;AT H(DSK)+1
,P(DSK)-1;"(2*sp)";AT H(DSK),P(D
SK)-1;"(2*sp)"
1700 LET SCO2=SCO2+10: LET H(DSK
)=H(DSK)+2: LET C(DSK)=COL
1710 PRINT  INK 1; PAPER C(DSK)/
8;AT H(DSK)+1,P(DSK)-1;"GH";AT H
(DSK),P(DSK)-1;"EF"
1720 IF H(DSK)<>18 THEN  GO TO 1
730
1722 PRINT  INK 0; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"(2*sp)";
AT H(DSK)+1,P(DSK)-1;"(2*sp)": L
ET P(DSK)=0: LET H(DSK)=0: LET L
IV2=LIV2+1: LET SCO2=SCO2+50: FO
R X=1 TO 20: BEEP .005,X*3: NEXT
 X
1725 IF LIV2=4 THEN  GO TO 4750:
 REM ALL SQUARE DISKS ACROSS
1730 IF RND>RND THEN  GO TO 1200
1740 LET GND=INT (RND*8)+2: LET
GND=GND*2: LET LEV=INT (RND*14)+
1: LET LEV=LEV*2
1760 FOR X=1 TO 8: IF LEV+2=P(X)
 THEN  GO TO 1200
1770 NEXT X
1780 PRINT  INK 7; BRIGHT 1;AT G
ND,LEV+1;"QS";AT GND+1,LEV+1;"RT
"
1790 GO TO 1200
4000 REM QUIT GAME
4010 FOR X=1 TO 30: BEEP .01,X*2
: BEEP .01,60-(X*2): NEXT X
4020 BRIGHT 1: PAPER 0: INK 7: B
ORDER 0: CLS
4030 PRINT  FLASH 1; BRIGHT 0;AT
 6,8;"GAME TERMINATED";
4040 PRINT AT 9,6;"SCORES:"
4050 PRINT AT 11,6;"PLAYER 1 = "
;SCO1;AT 13,6;"PLAYER 2 = ";SCO2
4060 PRINT AT 18,6;"ANOTHER GAME
 ?(Y/N)"
4070 IF INKEY$="N" OR INKEY$="n"
 THEN  STOP
4080 IF INKEY$="y" OR INKEY$="Y"
 THEN  RUN
4090 GO TO 4070
4500 REM ALL ROUND DISKS
4510 BRIGHT 0: PAPER 1: INK 7: C
LS
4520 PRINT  FLASH 1;AT 6,8;"PLAY
ER 1 WINS";AT 8,5;"AFTER CROSSIN
G OVER";AT 10,10;"ALL DISKS": FO
R F=1 TO 6: FOR Y=1 TO 40 STEP 3
: BEEP .005,Y: NEXT Y: NEXT F
4530 GO TO 4060
4750 REM ALL SQUARE DISKS
4760 BRIGHT 0: PAPER 2: INK 7: C
LS
4780 PRINT  FLASH 1;AT 6,8;"PLAY
ER 2 WINS";AT 8,5;"AFTER CROSSIN
G OVER";AT 10,10;"ALL DISKS"; FO
R F=1 TO 6: FOR Y=1 TO 40 STEP 4
: BEEP .004,Y: BEEP .008,40-Y: N
EXT Y: NEXT F
4790 GO TO 4060
5000 LET Z$="ABCDEFGHIJKLMNOPQRS
TU"
5010 FOR Y=1 TO 20
5020 FOR X=0 TO 7
5030 READ A
5040 POKE USR Z$(Y)+X,A
5050 NEXT X: NEXT Y
5060 RETURN
6000 DATA 0,7,15,31,63,127,127,1
27,0,224,240,248,252,254,254,254
,127,127,127,63,31,15,7,0,254,25
4,254,252,248,240,224,0
6010 DATA 0,1,3,7,15,31,63,127,0
,128,192,224,240,248,252,254,127
,63,31,15,7,3,1,0,254,252,248,24
0,224,192,128,0
6020 DATA 1,3,7,15,31,31,31,31,1
28,192,224,240,248,248,248,248,3
1,31,31,31,15,7,3,1,248,248,248,
248,240,224,192,128
6030 DATA 255,254,252,248,240,0,
0,0,0,0,0,240,248,252,254,255,0,
0,0,15,31,63,127,255,255,127,63,
31,15,0,0,0
6040 DATA 128,64,32,16,15,8,8,8,
8,8,8,15,16,32,64,128,1,2,4,8,24
0,16,16,16,16,16,16,240,8,4,2,1
6500 PAPER 3: BRIGHT 1: INK 7: B
ORDER 4: CLS
6505 PRINT  BRIGHT 1;AT 5,5;"AB"
;AT 6,5;"CD";AT 5,25;"EF";AT 6,
25;"GH"
6510 PRINT  INK 1; FLASH 1;AT 5,
10;"THE DEVIL'S";AT 6,13;"DISKS"
6515 PRINT AT 10,3;"DO YOU WANT
INSTRUCTIONS ?"
6520 INPUT "YES OR NO "; LINE A$
6530 IF a$="YES" OR A$="yes" THE
N  GO TO 6600
6540 IF A$="NO" OR a$="no" THEN
 RETURN
6550 GO TO 6520
6600 PAPER 5: INK 0: BRIGHT 0: B
ORDER 7: CLS
6610 PRINT AT 2,6;"MOVEMENT CONT
ROLS"; OVER 1;AT 2,6;"__________
_______"
6620 PRINT AT 5,1;"USE CURSOR CO
NTROLS TO LINE";AT 7,1;"UP THE A
RROWS TO THE DISK YOU";AT 9,1;"W
ANT TO MOVE."
6630 PRINT AT 12,1;"WHEN YOU HAV
E LINED UP YOUR";AT 14,1;"DISK,
THEN PRESS ""0"" TO MOVE."
6640 PRINT  INK 1;AT 17,1;"THIS
APPLYS TO BOTH PLAYERS."
6700 FOR x=1 TO 50: NEXT x: PAUS
E 4E4: CLS
6710 PRINT AT 3,2;"WHAT IF YOU C
AN NOT MOVE ?"
6720 PRINT  OVER 1;AT 3,2;"_____
_____________________"
6730 PRINT AT 6,5;"PLAYER 1 PRES
S ""1""";AT 8,12;"AND"
6740 PRINT AT 10,5;"PLAYER 2 PRE
SS ""2"""
6750 PRINT AT 13,4;"IF BOTH PLAY
ERS CAN NOT";AT 15,2;"MOVE THEN
PRESS ""Q"" TO QUIT"
6760 PRINT AT 17,2;"THE WINNER I
S DECIDED BY ";AT 19,5;"EACH PLA
YERS SCORES."
6770 FOR X=1 TO 50: NEXT X: PAUS
E 4E4: CLS
6800 PRINT AT 3,4;"THE RULES TO
MOVEMENT !"; OVER 1;AT 3,4;"____
___________________"
6810 PRINT AT 6,3;"THE COLOUR IN
FRONT OF THE ";AT 8,3;"THE DISK
YOU WANT TO MOVE";AT 10,5;"MUST
MATCH ONE OF THE";AT 12,3;"COLOU
RS DIRECTLY INFRONT";AT 14,4;"OR
 DIAGONALLY INFRONT OF";AT 16,5;
"YOUR OPPONENTS DISKS."
6900 FOR X=1 TO 50: NEXT X: PAUS
E 4E4: CLS
6910 PRINT  BRIGHT 1; INK 7; PAP
ER 0;AT 3,15;"QS";AT 4,15;"RT"
6920 PRINT AT 6,2;"WHAT'S THIS
^"
6930 PRINT AT 9,2;"WELL THIS IS
A COLLAPSED ";AT 11,2;"COLOUR, T
HAT CAN NOT BE MOVED";AT 13,2;"O
N BY YOUR DISKS BECAUSE THEY"
6940 PRINT AT 15,2;"ARE NEVER IN
FRONT OF YOUR ";AT 17,2;"DISKS B
UT SOMETIMES THEY ARE";AT 19,2;"
ON THE LEFT OR ON THE RIGHT."
7000 FOR X=1 TO 50: NEXT X: PAUS
E 4E4: CLS : GO TO 6500
```

FUNCTION FIT

FUNCTION FIT enables you to predict accurately the values of points on a graph which are not already known. The program works by taking a known set of values and constructing a function to suit them all as closely as possible. Obviously the more points you have the better the fit, and you will have to experiment with known functions to find the appropriate number for the accuracy you require. As an example, 25 points on a sine wave from 0 to 2 should give you accuracy to about 5 decimal places.

The program was written by J M Kelly of Solihull, West Midlands, and should prove useful in situations where full Fourier analysis of the type possible with **Abacus** is not required.

```
100 WINDOW#0,512,30,0,210:WINDOW
 512,202,0,0:WINDOW#2,512,202,0,
0:PAPER#2,2:PAPER 2:PAPER#0,6:IN
K 7:INK#0,0:BORDER 1,7:BORDER#2,
1,7:BORDER#0,1,5:MODE 4
110 get_mat:reduce  MAT,size:bac
k MAT,size:SETUP_STRING:CLS:MATH
_PRINT 1,A$:CLS#0:A_FEW_NUMBERS:
CLS#0:STOP
120 :
130 DEFine PROCedure SETUP_STRIN
G
140 r=size+1:A$='!'
150 REPeat loop
160 r=r-1
170 IF r=0:EXIT loop
180 REPeat test
190 IF MAT(0,r)=0:EXIT test
200 IF MAT(0,r)>0:A$=A$&'+ '
210 IF MAT(0,r)<0:A$=A$&'- '
220 A$=A$&ABS(MAT(0,r))
230 IF r-1=1:A$=A$&"x "
240 IF r-1>1:A$=A$&"x^"&(r-1)&"!
 "
250 EXIT test
260 END REPeat test
270 END REPeat loop
280 END DEFine SETUP_STRING
290 :
300 DEFine PROCedure A_FEW_NUMBE
RS
310 REPeat forever
320 INPUT#0,'Value for x = ',C$,
'Y = ',:kkk=0
330 IF C$ INSTR 'quitQUITstopSTO
PendENDFINfinABORTabort':EXIT fo
rever
340 FOR r=0 TO size-1
350 kkk=kkk+MAT(0,r+1)*C$^r
360 END FOR r
370 PRINT#0,kkk
380 END REPeat forever
390 END DEFine A_FEW_NUMBERS
400 :
410 DEFine PROCedure get_mat
420 LOCal r,rr
430 INPUT'Number of elements ';s
ize
440 DIM TEMP(size,1),spare(size,
size+1),MAT(size,size+1)
450 FOR r=1 TO size
460 INPUT'X = ';TEMP(r,0);TO 10;
'Y = ';TEMP(r,1)
470 END FOR r
480 FOR rr=1 TO size
490 FOR r=0 TO size-1
500 MAT(rr,r+1)=TEMP(rr,0)^r
510 END FOR r
520 MAT(rr,r+2)=TEMP(rr,1)
530 END FOR rr
540 FOR r=1 TO size
550 FOR rr=1 TO size+1
560 spare(r,rr)=MAT(r,rr):END FO
R rr:END FOR r
570 pivot MAT,size,1
580 END DEFine get_mat
590 :
600 DEFine PROCedure reduce(TEMP
,B)
610 LOCal C,d,E,F
620 FOR C=1 TO B-1
630 FOR d=C+1 TO B
640 pivot TEMP,B,d:F=TEMP(d,C)/T
EMP(C,C):FOR E=1 TO B+1:TEMP(d,E
)=TEMP(d,E)-TEMP(C,E)*F
650 END FOR d:END FOR C
660 END DEFine reduce
670 :
680 DEFine PROCedure swap(TEMP,A
,B,C)
690 LOCal d
700 FOR d=1 TO C+1:TEMP(0,d)=TEM
P(A,d):TEMP(A,d)=TEMP(B,d):TEMP(
B,d)=TEMP(0,d)
710 END DEFine swap
720 :
730 DEFine PROCedure pivot(TEMP,
B,F)
740 LOCal C,d
750 FOR C=F TO B-1
760 FOR d=C+1 TO B:IF TEMP(C,F)<
TEMP(d,F):swap TEMP,C,d,B
770 END FOR C
780 END DEFine pivot
790 :
800 DEFine PROCedure back(TEMP,A
)
810 LOCal B,C,k
820 FOR B=1 TO A
830 k=2:FOR C=1 TO A
840 IF ABS(TEMP(B,C))>1E-8:k=0
850 END FOR C:END FOR B:alert k
860 FOR B=1 TO A
870 IF TEMP(B,B)=0:k=1
880 END FOR B:alert k
890 IF k=1 OR k=2: END DEFine ba
ck
900 FOR B=0 TO A+1:TEMP(0,B)=0
910 FOR B=A TO 1 STEP -1
920 pp=0:FOR C=A TO B+1 STEP -1
930 pp=pp+TEMP(B,C)*TEMP(0,C)
940 END FOR C
950 TEMP(B,A+1)=TEMP(B,A+1)-pp
960 TEMP(0,B)=TEMP(B,A+1)/TEMP(B
,B)
970 END FOR B
980 END DEFine back
990 :
1000 DEFine PROCedure alert(A)
1010 IF A=1:PRINT\'No Solution a
vailable'
1020 IF A=2:PRINT\'There is an i
nfinite number of'\'solutions'
1030 END DEFine alert
1040 :
1050 DEFine PROCedure MATH_PRINT
(s,P)
1060 FOR counter=s TO LEN(P)
1070 part$=P(counter TO counter)
1080 IF CODE(part$)=94:upper cou
nter,P
1090 IF CODE(part$)=124:standard
 counter+1,P
1100 END FOR counter
1110 END DEFine MATH_PRINT
1120 :
1130 DEFine PROCedure upper(P,q)
1140 CSIZE 2,0
1150 FOR r=P+1 TO LEN(q)
1160 REPeat test1
1170 IF CODE(q(r TO r))=124 OR C
ODE(q(r TO r))=2:r=LEN(q):EXIT t
est1
1180 PRINT q(r TO r);:x=r+1
1190 EXIT test1
1200 END REPeat test1
1210 END FOR r
1220 MATH_PRINT x,q
1230 END DEFine
1240 :
1250 DEFine PROCedure standard(P
,q)
1260 CSIZE 2,1
1270 FOR r=P TO LEN(q)
1280 REPeat test2
1290 IF CODE(q(r TO r))=94 OR CO
DE(q(r TO r))=124:r=LEN(q):EXIT
test2
1300 PRINT q(r TO r);:x=r+1
1310 EXIT test2
1320 END REPeat test2
1330 END FOR r
1340 MATH_PRINT x,q
1350 END DEFine
```



FLOWER

WIN THE HEART of your loved one with a bunch of flowers. However, you must deal with monstrous spiders while picking the flowers.

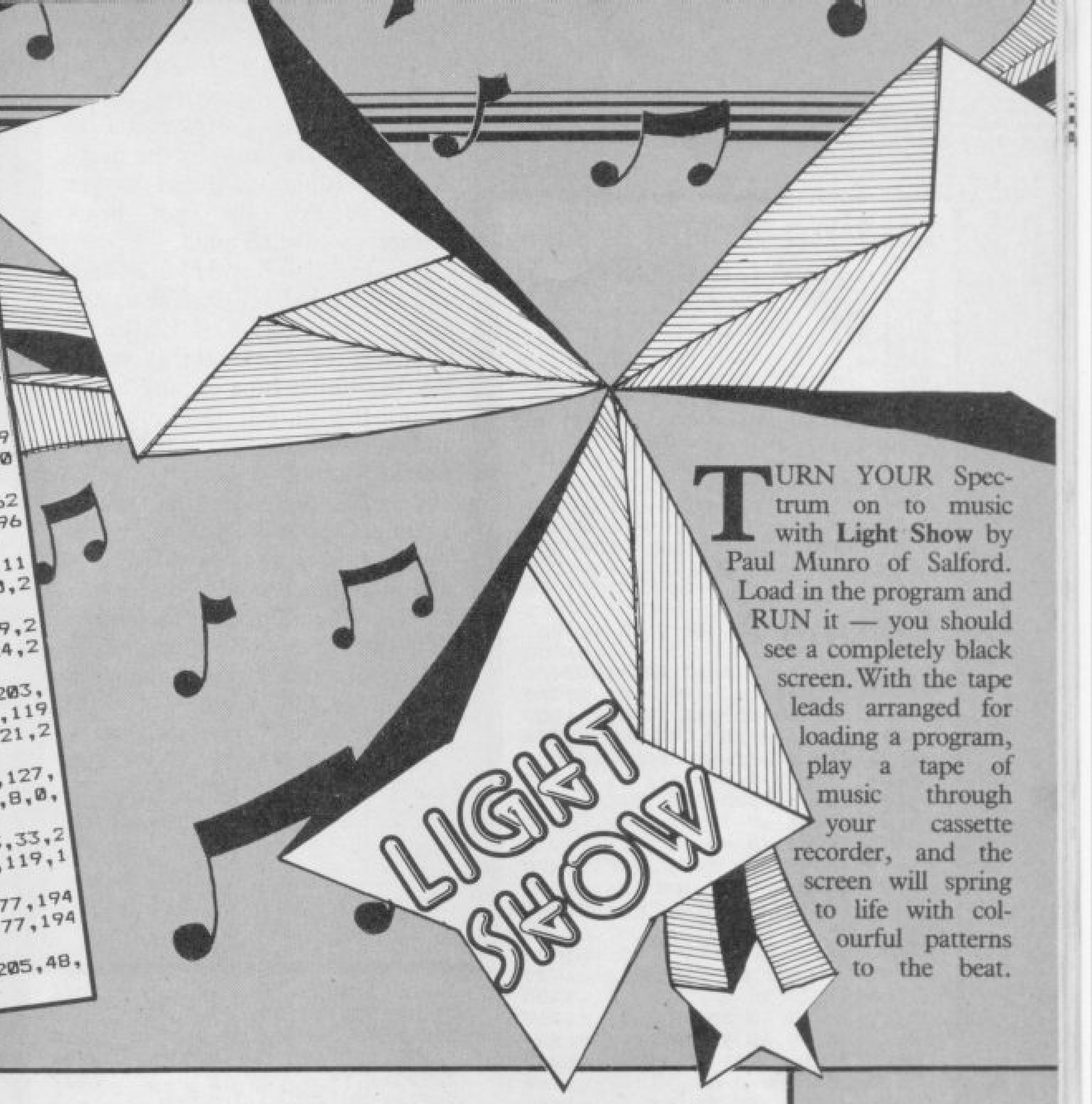
Flower Power, written by I D Birdesey of Wallsend, Tyne and Wear, runs on any Spectrum. There are two listings. Type in the first and SAVE it. Then type in the second, which generates two machine code routines and automatically SAVEs them after the main listing.

The game uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

Listing One

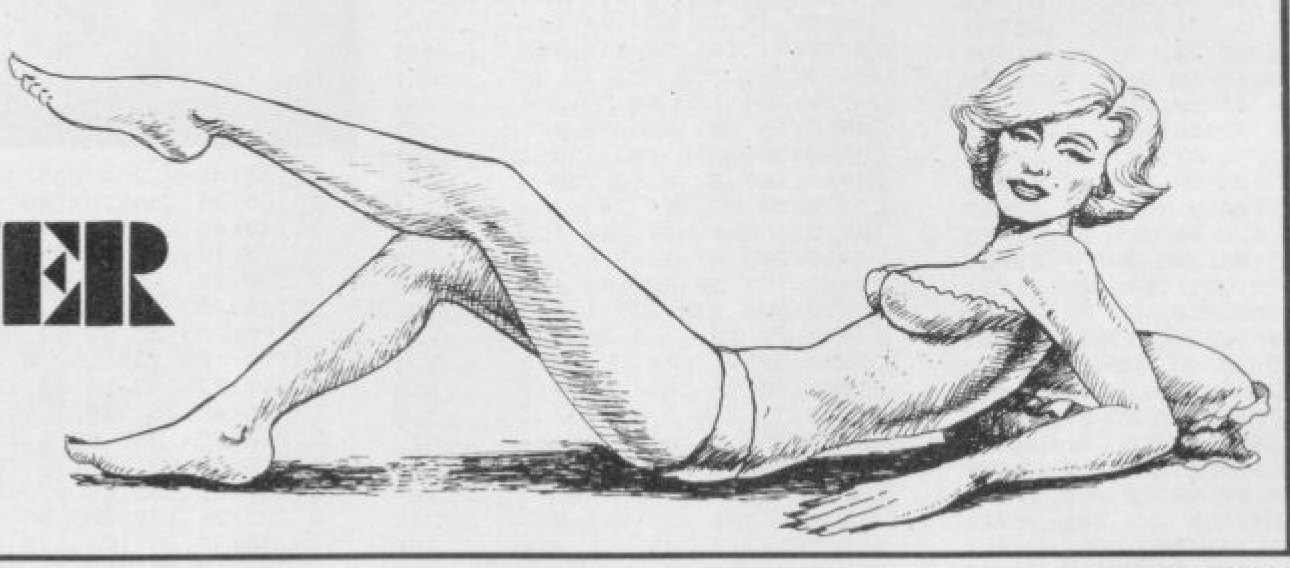
```
  10 BORDER 0: INK 0: PAPER 0: F
LASH 0: BRIGHT 0: OVER 0: INVERS
E 0: CLS
  15 CLEAR 31765: LET h=0: RANDO
MIZE : LOAD ""CODE USR "a": LOAD
 ""CODE
  40 RESTORE 100: INK 4: PLOT 7,
72: DRAW 241,0: DRAW 0,-9: DRAW
-241,0: DRAW 0,8: INK 0
  50 PRINT  INK 6;AT 7,2;"EF";AT
 8,2;"GH";AT 7,28;"EF";AT 8,28;"
GH"; INK 5;AT 16,14; FLASH 1;"KE
YS"; FLASH 0;AT 18,12;"q...Left"
;AT 19,12;"e..Right";AT 20,12;"p
.....Up";AT 21,12;"k...Down"
  60 LET a$="(32*sp)Herbert must
 collect the flowers on each scr
een to rescue Wilma.     The pro
blem is that he must avoid the n
asties which roam the screen.
Press any key to begin."
  70 READ p: IF p<0 THEN  RESTOR
E 100: GO TO 70
  80 PRINT  INK 3;AT 13,1;a$( TO
 30): LET a$=a$(2 TO )+a$(1): IF
 INKEY$<>"" THEN  GO TO 100
  90 BEEP .1,p: GO TO 70
 100 DATA 0,0,0,0,4,4,4,4,5,7,7,
7,7,7,7,9,11,12,12,7,7,7,9,7,5,4
,4,0,0,0,0,0,0
 110 DATA 5,5,9,9,9,9,7,5,4,4,7,
7,7,7,7,7,2,2,5,5,5,5,4,2,4,4,7,
7,7,7,7,7,5,5,9,9,9,9,7,5
 120 DATA 4,4,7,7,7,7,9,11,12,12
,7,7,7,9,7,5,4,4,0,0,0,0,0,0,-1
 130 LET s=0: LET l=3: LET b=1
 140 LET a$="(10*Q)": CLS : POKE
 23560,0: IF l=0 THEN  GO TO 20
 145 IF b=14 THEN  LET b=1
 150 FOR n=1 TO 5: PRINT  INK 2;
AT n+4,n+10;a$(n TO 11-n): NEXT
n
 160 PRINT  INK 5;AT 11,12;"KL";
AT 12,12;"MN"
 170 PRINT  INK 7;AT 11,18;"KL";
AT 12,18;"OP"
 180 PRINT  INK 6;AT 11,15;"EF";
AT 12,15;"GH"
 190 PRINT  INK 3;AT 14,1;"Can y
ou win the heart of Wilma";AT 15
,5;"on screen number: ";b;" ?"
 200 RESTORE 210: FOR n=1 TO 30:
 READ p: BEEP .1,p: NEXT n
 210 DATA 0,-2,-3,-3,0,0,0,0,0,0
,2,2,0,0,0,0,-2,-2,-3,-3,0,0,5,5
,5,7,9,9,9,9,9
 220 POKE 31804,4*b+14: POKE 318
97,4*b+14
 230 LET a=32080: FOR f=1 TO b
 240 LET x=INT (RND*3)-1: LET y=
INT (RND*3)-1: IF x=0 OR y=0 THE
N  GO TO 240
 250 FOR n=0 TO 30 STEP 10: POKE
 a+n,144+(n/10): POKE a+1+n,2: P
OKE a+3+n,x: POKE a+7+n,y: NEXT
n
 260 LET x=INT (RND*12)+3: LET y
=INT (RND*20)+3
 270 FOR n=0 TO 10 STEP 10: POKE
 a+2+n,x: POKE a+22+n,x+1: POKE
a+6+(n*2),y: POKE a+16+(n*2),y+1
 280 POKE a+4+n,2: POKE a+24+n,3
: POKE a+5+n,16: POKE a+25+n,17
 290 POKE a+8+(n*2),2: POKE a+18
+(n*2),3: POKE a+9+(n*2),23: POK
E a+19+(n*2),24: NEXT n
 300 LET a=a+40: NEXT f: CLS
 310 PRINT  INK 6;AT 0,0;"EF";AT
 1,0;"GH";AT 18,0;"EF";AT 19,0;"
GH";AT 0,25;"EF";AT 1,25;"GH";AT
 18,25;"EF";AT 19,25;"GH"
 320 FOR n=0 TO 18 STEP 3: PRINT
  INK 4;AT n,28;"R";AT n+1,28;"S
": NEXT n: PRINT  INK 4;AT 3,1;"
R";AT 4,1;"S";AT 15,1;"R";AT 16,
1;"S"
 330 LET x=9: LET y=0: LET d=0:
LET f=0
 340 LET ox=x: LET oy=y
 350 PRINT AT 0,0;: RANDOMIZE US
R 31766
 360 LET k=PEEK 23560-101
 370 LET x=x+(k=6 AND x<18)-(k=1
1 AND x>0)
 380 LET y=y+(k=0 AND y<30)-(k=1
2 AND y>0)
 400 GO SUB 440: IF d=1 THEN  GO
 TO 140
 410 PRINT AT ox,oy;"(2*sp)";AT
ox+1,oy;"(2*sp)"; INK 5;AT x,y;"
KL";AT x+1,y;"MN"
 420 PRINT  INK 6;AT 20,0;"SCORE
:";s;AT 20,25;"LIVES:";l;AT 20,1
3;"HIGH:";h
 430 GO TO 340
 440 IF (ATTR (x,y)=0 OR ATTR (x
,y)=5) AND (ATTR (x,y+1)=0 OR AT
TR (x,y+1)=5) AND (ATTR (x+1,y)=
0 OR ATTR (x+1,y)=5) AND (ATTR (
x+1,y+1)=0 OR ATTR (x+1,y+1)=5)
THEN  RETURN
 450 IF ATTR (x,y)=7 OR ATTR (x,
y+1)=7 OR ATTR (x+1,y)=7 OR ATTR
 (x+1,y+1)=7 THEN  GO TO 540
 460 IF ATTR (x,y)=6 OR ATTR (x,
y+1)=6 OR ATTR (x+1,y)=6 OR ATTR
 (x+1,y+1)=6 THEN  GO TO 490
 470 IF ATTR (x,y)<5 OR ATTR (x,
y+1)<5 OR ATTR (x+1,y)<5 OR ATTR
 (x+1,y+1)<5 THEN  GO TO 560
 480 RETURN
 490 LET u=(x>16)*18: LET i=(y>2
3)*25
 500 FOR n=6 TO 0 STEP -1: PRINT
  INK n;AT u,i;"EF";AT u+1,i;"GH
": BEEP .01,20-n: NEXT n
 510 LET s=s+10: LET f=f+1: IF f
<4 THEN  RETURN
 520 PRINT AT 9,28;"(sp)";AT 10,
28;"(sp)": BEEP .1,-20: BEEP .01
,50
 530 RETURN
 540 FOR n=0 TO 20: BEEP .005,n:
 NEXT n
 550 LET s=s+100: LET b=b+1: GO
TO 140
 560 PRINT AT ox,oy;"(2*sp)";AT
ox+1,oy;"(2*sp)"; INK 7;AT x,y;"
(ig2,ig1)";AT x+1,y;"(g5,ig5)"
 570 BEEP .4,0: BEEP .4,0: BEEP
.2,0: BEEP .4,0: BEEP .4,2: BEEP
 .2,1: BEEP .4,1: BEEP .2,0: BEE
P .4,0: BEEP .2,-1: BEEP .8,0
 590 LET l=l-1: IF l>0 THEN  LET
 d=1: RETURN
 600 IF s>h THEN  LET h=s
 610 LET d=1: RETURN
```

```
  1 CLEAR 29999: BORDER 0: PAPE
R 0: INK 7: BRIGHT 1: CLS
  10 FOR f=0 TO 113: READ a: POK
E (30000+f),a: NEXT f
  20 FOR f=0 TO 77: READ a: POKE
 (31000+f),a: NEXT f
  25 PRINT AT 0,0;"  PLAY MUSIC
INTO THE EAR PHONE ";AT 1,5;"AS
IF YOU ARE LOADING": PRINT AT 21
,0; FLASH 1;"         PRESS ANY K
EY         ": PAUSE 0: INK 0: C
LS
  27 RANDOMIZE USR 31000
  30 DATA 33,15,88,6,11,197,84,9
3,19,6,16,205,106,117,203,191,20
3,159,203,167,203,175
  40 DATA 119,18,43,19,16,239,62
,48,35,61,32,252,193,16,224,1,96
,1,33,0,88,17
  50 DATA 191,90,126,18,27,35,11
,120,177,254,0,32,245,201,14,0,2
19,254,203,119,40,4
  60 DATA 203,193,24,2,203,129,2
19,254,203,119,40,4,203,201,24,2
,203,137,219,254,203,119
  70 DATA 40,4,203,209,24,2,203,
145,219,254,203,119,40,4,203,119
,40,4,203,241,24,2,203,117,121,2
01
  80 DATA 0,127,127,127,127,127,
127,0,17,88,255,33,24,121,1,8,0,
237,176,62,2,205
  90 DATA 1,22,62,1,237,163,33,2
55,87,17,0,88,1,191,2,62,0,119,1
,192,2,62
  100 DATA 144,215,11,120,177,194
,67,121,1,9,0,118,11,120,177,194
,79,121,58,8,92,254
  110 DATA 32,202,100,121,205,48,
117,195,76,121,201,201
```



TURN YOUR Spectrum on to music with **Light Show** by Paul Munro of Salford. Load in the program and RUN it — you should see a completely black screen. With the tape leads arranged for loading a program, play a tape of music through your cassette recorder, and the screen will spring to life with colourful patterns to the beat.

POWER



Listing Two

```
  10 BORDER 0: INK 7: PAPER 0: F
LASH 0: BRIGHT 0: OVER 0: INVERS
E 0: CLS : CLEAR 31765
  20 DEF FN h(a$)=16*(CODE a$(n)
-48-(39 AND a$(n)>"9"))+CODE a$(
n+1)-48-(39 AND a$(n+1)>"9")
  30 FOR l=80 TO 220 STEP 10: PR
INT "Line: ";l;: READ a,c,a$: LE
T t=0
  40 FOR n=1 TO LEN a$ STEP 2
  50 POKE a,FN h(a$): LET t=t+FN
 h(a$): LET a=a+1: NEXT n
  60 IF c<>t THEN  BEEP .1,50: P
RINT TAB 10;"ERROR:";TAB 17;"Tot
al:";t'TAB 17;"Check:";c: STOP
  70 PRINT : NEXT l
  80 DATA USR "a",4164,"04242323
9389671f2024c4c4c991e6f8374f9dae
adaf2702ecf2b975b5f5e440"
  90 DATA USR "e",3716,"03070707
3b7d7e7ec0e0e0e0dcbe7e7e7d3b0f17
27438000bedce0e0e0c00000"
 100 DATA USR "k",1059,"070f1832
20242330e0f0184c0424c40c"
 110 DATA USR "m",1758,"1f100908
0f7181fff8089010f08e81ff"
 120 DATA USR "o",2028,"fff04908
0f31437dff0f9210f08cc2be"
 130 DATA USR "q",533,"00367f7f7
f3e1c08"
 140 DATA USR "r",1863,"083c6bd6
6a57ea566b56ff817e42427e"
 150 DATA USR "t",1373,"1c141c05
063c7eff382838a060387eff"
 160 DATA 31803,6793,"060e21c47c
23233e10d73e00d73e16d77ed74f237e
814f237eb920052b3601180d237eb920
062b2b36ff18022b2b2b71232323237e
d74f3e20d7237e814f237eb920052b36
01180d237eb920062b2b36ff18022b2b
2b712323232310a8"
 170 DATA 31896,3582,"060e21c47c
3e10d7237ed73e16d7237ed723232323
7ed72b2b2b2b2b2b7ed7232323232323
2323232310dac9"
 180 DATA 31940,1372,"a303010000
0002010217a403010000000003010318a3
031200000017ff0217a40312000000018
ff0318"
 190 DATA 32040,1376,"a303000001
0117ff0217a40300000010118ff0318a3
03130000000002010217a40313000000003
010318"
 200 DATA 31980,858,"9a070001001
21e0000009b070001001 21f0000009e0
70101011131e0000009f070101011131f0
00000"
 210 DATA 32020,428,"a3030201021
119000000a403020102111a000000"
 220 DATA 31766,2164,"061921227c
7ed72310fb18191615081005110162 79
2049414e20442e424952445345591100
"
 230 PRINT ''"-PRESS ANY KEY TO
SAVE THE CODE-"
 240 IF INKEY$="" THEN  GO TO 24
0
 250 SAVE "FPgraph"CODE USR "a",
168
 260 SAVE "FPcode"CODE 31766,314
```



ROCKS

THE GIGANTIC astral gibbon of Aldebaran 4 is throwing green rocks at you. He's been hired by the man-eating molluscs of Rigel to get you. They've also got heat-seeking missiles. Tough.

So – use keys B and N to dodge, and CAPS SHIFT to fire at the missiles and rocks. C Clarke of Oldham in Lancashire wrote **Rocks**, which runs on any Spectrum. It's in full machine-code and was written with the OCP **Editor/Assembler**.

To enter the code, first type in Listing One and RUN it. Enter the first start address – 24575 – and then the decimal numbers one by one. The number at the end of each line is a checksum, which you can check against the sum printed on the screen.

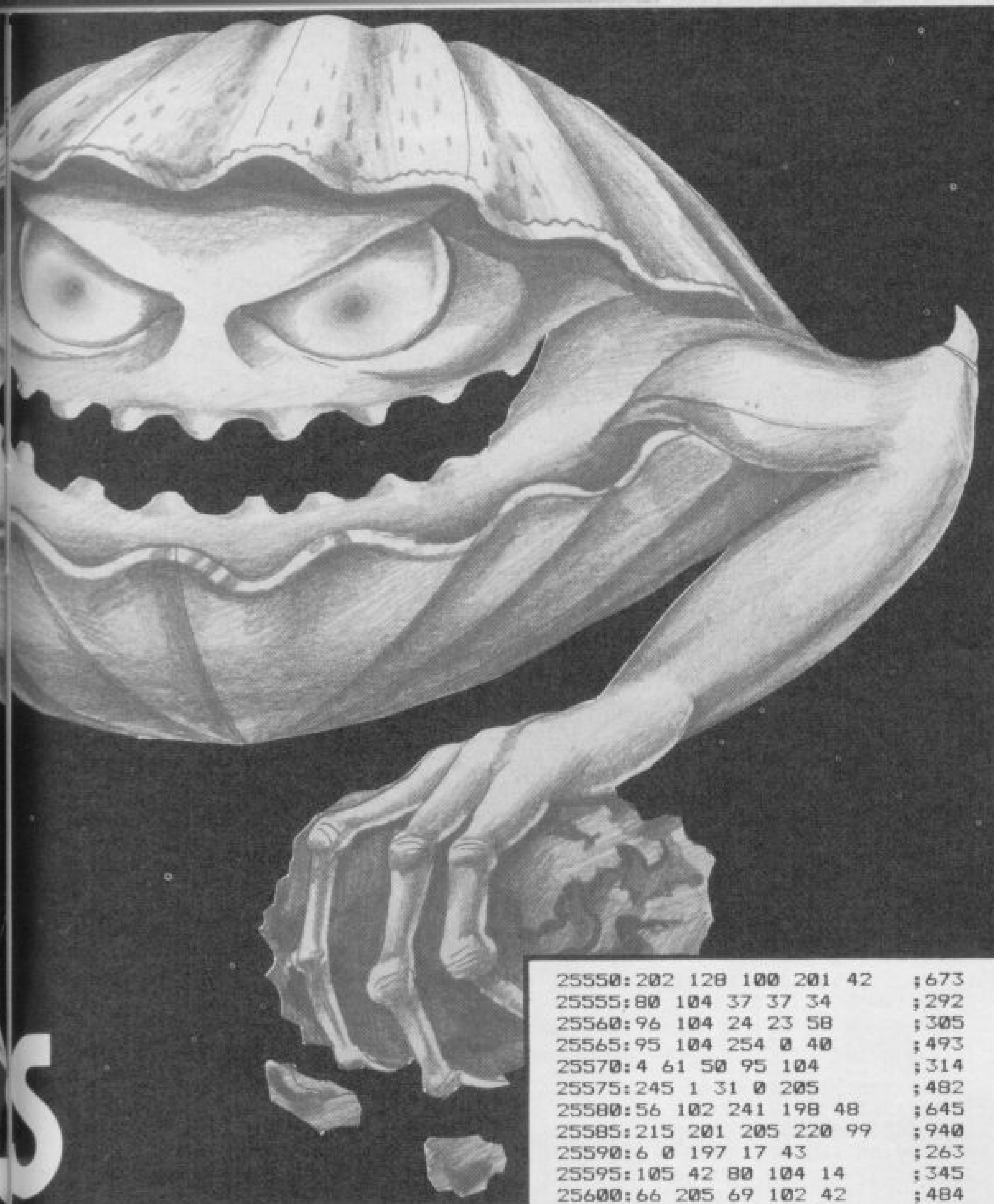
When you've done all that, a final checksum will be worked out, which should come to 237822. Delete line 1 from the Basic listing. Enter SAVE "ROCKS" LINE 1: SAVE "rockscode" CODE 24575, 2450, and VERIFY.

Listing 1

```
   1 INPUT "Start address:";n: F
OR b=n TO 27000: PRINT b;":";: L
ET tot=0: FOR j=1 TO 5: INPUT a:
 PRINT a;" ";: POKE b,a: LET tot
=tot+a: LET b=b+1: NEXT j: LET b
=b-1: PRINT TAB 27;";";tot: NEXT
 b: LET tot=0: FOR n=24575 TO 26
989: LET tot=tot+PEEK n: NEXT n:
 PRINT "Final checksum:";tot
   2 BORDER 0: PAPER 0: INK 7: B
RIGHT 1: RANDOMIZE : CLEAR 24575
: PRINT AT 9,7;"ROCKS! IS LOADIN
G";AT 13,10; FLASH 1;"PLEASE WAI
T": INK 0: LOAD ""CODE : INK 7:
RANDOMIZE USR 24576
```

Listing 2

```
24575:62 205 175 13 33   ;488
24580:7 6 34 113 104        ;264
24585:62 255 50 112 104     ;583
24590:195 130 102 243 62    ;732
24595:71 50 141 92 205      ;559
24600:175 13 1 0 0          ;189
24605:205 56 102 205 255    ;823
24610:96 83 67 79 82        ;407
24615:69 58 48 48 48        ;271
24620:48 48 48 255 1        ;400
24625:25 0 205 56 102       ;388
24630:205 255 96 76 73      ;705
24635:86 69 83 58 51        ;347
24640:255 1 0 1 205         ;462
24645:56 102 205 255 96     ;714
24650:84 73 77 69 32        ;335
24655:58 48 48 58 48        ;260
24660:48 58 48 48 255       ;457
24665:33 106 104 17 107     ;367
24670:104 1 5 0 54          ;164
24675:0 237 176 33 0        ;446
24680:88 54 71 17 1         ;231
24685:88 1 63 0 237         ;389
24690:176 33 15 20 34       ;278
24695:80 104 33 64 88       ;369
24700:54 68 17 65 88        ;292
24705:1 192 2 237 176       ;608
24710:33 85 104 54 0        ;276
24715:17 86 104 1 4         ;212
24720:0 237 176 62 3        ;478
24725:50 95 104 205 200     ;654
24730:101 175 211 254 50    ;791
24735:72 92 205 103 97      ;569
24740:205 67 98 205 176     ;751
24745:98 205 28 99 205      ;635
24750:9 97 205 223 101      ;635
24755:205 182 99 58 95      ;639
24760:104 254 0 40 23       ;421
24765:1 254 127 237 120     ;739
24770:203 71 40 14 58       ;386
24775:104 104 254 255 196   ;913
24780:236 96 175 50 104     ;661
24785:104 24 205 33 0       ;366
24790:88 17 1 88 1          ;195
24795:0 3 54 56 237         ;350
24800:176 62 56 50 72       ;416
24805:92 62 7 211 254       ;626
24810:251 201 17 2 0        ;471
24815:33 220 5 205 181      ;644
24820:3 243 1 32 3          ;282
24825:11 120 177 32 251     ;594
24830:201 225 126 35 229    ;816
24835:254 255 200 215 24    ;948
24840:246 58 105 104 254    ;767
24845:2 40 5 60 50          ;157
24850:105 104 201 175 50    ;635
24855:105 104 33 111 104    ;457
24860:126 60 254 10 56      ;506
24865:26 175 119 43 126     ;489
24870:60 254 6 56 17        ;393
24875:175 119 43 229 193    ;759
24880:17 106 104 167 237    ;631
24885:82 40 5 197 225       ;549
24890:24 224 119 1 6        ;374
24895:1 205 56 102 6        ;370
24900:3 33 106 104 197      ;443
24905:229 126 198 48 215    ;816
24910:225 35 229 126 198    ;813
24915:48 215 62 58 215      ;598
24920:225 193 35 16 235     ;704
24925:1 14 1 205 56         ;277
24930:102 62 32 215 201     ;612
24935:175 50 82 104 50      ;461
24940:91 104 58 112 104     ;469
24945:254 255 202 12 98     ;821
24950:254 128 40 55 254     ;731
24955:64 202 228 97 1       ;592
24960:254 247 237 120 203   ;1061
24965:103 32 7 62 255       ;459
24970:50 82 104 24 14       ;274
24975:1 254 239 237 120     ;851
24980:203 87 32 5 62        ;389
24985:127 50 82 104 1       ;364
24990:254 239 237 120 203   ;1053
24995:71 32 6 62 255        ;426
25000:50 91 104 201 175     ;621
25005:50 91 104 201 219     ;665
25010:31 254 2 40 33        ;360
25015:254 1 40 23 254       ;572
25020:16 40 31 254 17       ;358
25025:40 5 254 18 40        ;357
25030:6 201 205 210 97      ;719
25035:24 17 205 216 97      ;559
25040:24 12 62 127 50       ;275
25045:82 104 201 62 255     ;704
25050:50 82 104 201 62      ;499
25055:255 50 91 104 201     ;701
25060:1 254 239 237 120     ;851
25065:245 203 103 40 16     ;607
25070:203 95 40 19 241      ;598
25075:203 71 194 172 97     ;737
25080:62 255 50 91 104      ;562
25085:201 62 255 50 82      ;650
25090:104 24 237 62 127     ;554
25095:50 82 104 24 230      ;490
25100:1 254 127 237 120     ;739
25105:203 103 40 26 203     ;575
25110:95 40 26 175 50       ;386
25115:82 104 1 254 254      ;695
25120:237 120 203 71 40     ;671
25125:5 175 50 91 104       ;425
25130:201 62 255 24 248     ;790
25135:62 255 24 231 62      ;634
25140:127 24 227 42 80      ;500
25145:104 17 13 105 14      ;253
25150:68 205 69 102 201     ;645
25155:58 82 104 254 0       ;498
25160:40 8 254 255 40       ;597
25165:24 254 127 40 57      ;502
25170:42 80 104 17 209      ;452
25175:104 14 71 205 69      ;463
25180:102 58 91 104 254     ;609
25185:255 204 175 100 201   ;935
25190:205 55 98 42 80       ;480
25195:104 125 254 0 40      ;523
25200:225 45 34 80 104      ;488
25205:45 45 205 3 99        ;397
25210:254 255 40 6 175      ;730
25215:50 99 104 24 206      ;483
25220:62 255 50 99 104      ;570
25225:24 199 205 55 98      ;581
25230:42 80 104 125 254     ;605
25235:30 40 188 44 34       ;336
25240:80 104 44 44 205      ;477
25245:3 99 254 255 40       ;651
25250:6 175 50 98 104       ;433
25255:24 169 62 255 50      ;560
25260:98 104 24 162 6       ;394
25265:3 197 205 242 98      ;745
25270:254 30 48 249 38      ;619
25275:2 111 229 205 3       ;550
25280:99 225 254 255 40     ;873
25285:40 36 229 205 3       ;513
25290:99 225 254 255 40     ;873
25295:30 38 2 229 205       ;504
25300:242 98 203 79 40      ;662
25305:11 225 17 115 104     ;472
25310:14 68 205 69 102      ;458
25315:24 9 225 17 145       ;420
25320:104 14 68 205 69      ;460
25325:102 193 16 193 201    ;705
25330:42 118 92 84 93       ;429
25335:41 41 25 41 41        ;189
25340:41 25 34 118 92       ;310
25345:124 201 205 104 102   ;736
25350:6 8 126 254 0         ;394
```



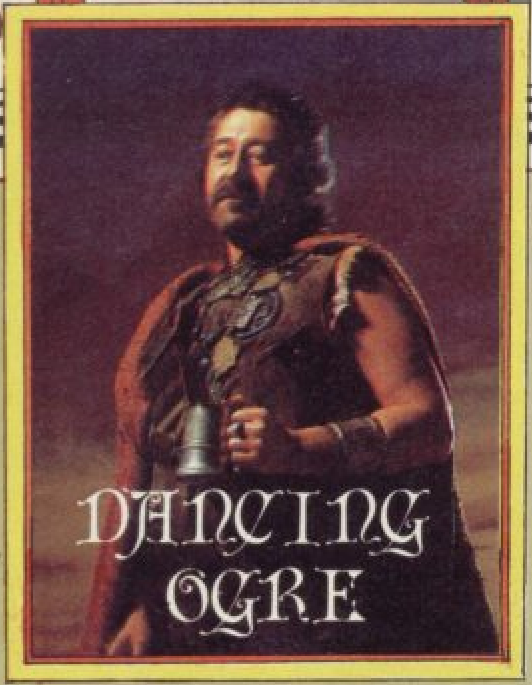
```
25355:32 12 35 126 254        ;459
25360:0 32 6 43 36            ;117
25365:16 241 175 201 62       ;695
25370:255 201 1 0 8           ;465
25375:237 67 83 104 175       ;666
25380:50 94 104 205 82        ;535
25385:98 205 76 99 237        ;715
25390:75 83 104 120 254       ;636
25395:159 48 50 4 237         ;498
25400:67 83 104 175 50        ;479
25405:91 104 58 94 104        ;451
25410:254 8 40 221 60         ;583
25415:50 94 104 24 222        ;494
25420:237 75 83 104 205       ;704
25425:170 34 229 237 75       ;745
25430:83 104 120 214 8        ;529
25435:71 205 170 34 84        ;564
25440:93 225 1 32 0           ;351
25445:237 176 201 1 0         ;615
25450:2 205 56 102 6          ;371
25455:32 62 32 215 16         ;357
25460:251 33 64 88 17         ;453
25465:65 88 1 31 0            ;185
25470:54 68 237 176 175       ;710
25475:50 91 104 58 100        ;403
25480:104 254 200 48 3        ;609
25485:195 82 98 42 102        ;519
25490:104 229 205 104 102     ;744
25495:205 119 102 62 68       ;556
25500:119 35 119 225 124      ;622
25505:254 20 40 10 36         ;360
25510:34 102 104 205 252      ;697
25515:101 195 82 98 205       ;681
25520:44 102 205 200 101      ;652
25525:201 42 80 104 37        ;464
25530:205 3 99 254 255        ;816
25535:40 17 58 98 104         ;317
25540:254 255 202 117 100     ;928
25545:58 99 104 254 255       ;770
25550:202 128 100 201 42      ;673
25555:80 104 37 37 34         ;292
25560:96 104 24 23 58         ;305
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OUR PARTY was forced to remain at the fort of Uusuun-An for two days because of the turmoil along the Great Road. Colonel Ishiru, the commander there, told me that the snake folk were greatly angered because some human had defiled the shrine of their python-god, Szasassa. One of the huge sapphire eyes of the cult image had been stolen and not yet recovered. When we reached that point in our talk Iubba, the snake men's captive, hurriedly excused himself. He has been complaining of the bellyache and swears something he ate disagreed with him. Hmm . . . .

This Iubba claims the snake people took him for fresh meat — that is hard to credit for he is all skin and bone, and small with it. Either they like their men stringy or there is another side to the tale. He has asked to join us on our trek. Since the services of a locksmith are always handy I have agreed. He will fit in places I could not.

On the subject of bellies, you will be distrubed to hear that I have damaged my protuberance! In my sleep I rolled over and crushed the bottle that held the fiery Micro-Demon I bought from Zignash the Ectoplasmist. Before it expired from fright beneath my weight, it caused a distinct soreness and redness on my poor flesh. I shall be returning it to Zignash for replacement you may be sure.

More travellers arrived to shelter at the fort and there was little to do but talk and dice. Paul of Polesworth passed on news of his stay within the walls of **Dun Darach.** *Here, there are many secret doors which may be found in the blank walls which carry torches.*

"First," says Paul, "obtain a book from the shop in King Street. Give it to the Lady Mhor and she will give one in return. That will open the secret door in Myre Street. The shield found hidden here can be offered to the great Goddess Danu. Now, on Old Hill you may get a lyre. Dain, who dwells behind the ever-open secret door in Park Row, will exchange that lyre of a shield sacred to Midir. Offer it to the god and you shall receive a key."

Much money may be made in this sorcerous place. "This is simple, O Large One. Take gold from the Assayers in West Way and sell it to the brokers in Cross Street. There are other means but that is easiest. But beware the thieves — they will always take the possession you have placed your star beside. Thus it is safer never to place your star on a valued object — leave it on your stock of Iridi which can be easily replaced."

Despite his knowledge, Paul seeks advice on other problems here. He wishes to know how to remove the Pearl from the Strong Room on the north wall, and he cannot find a way into the Inner Castle from the jail. Share your experience with him and receive help by writing to him at The Vicarage, Polesworth, Tamworth, Staffordshire.

Grimwood the Exciseman has wandered the paths of the Irish legends too, in **Tir Na Nog.** *Though partially successful he could not find the egg to open the N door. To locate that he should go to*

In the fort of Uusuun-An, Gordo dices with weary adventurers

Ruads Retreat carrying some sand. Nor could he leave the Row in the Plain of Lies — seek out a secret and invisible door for an exit.

Now this Grimwood has tried to read the second scroll he found in the library. He knows it to be written in Ogham, the ancient Celtic script, but his translation is meaningless. The McKenna of Croydon, a battle weary veteran, told us all that the script is corrupt and should read Crossroad Ten North. Perhaps that means ten paces north from a crossroads?

The McKenna has fulfilled the quests of both **Tir Na Nog** *and* **Dun Darach.** *Help he offers if you write, courier prepaid, to 35, Havelock Road, Croydon, Surrey. As the night fell and the beer flowed the voices of those* **Bored of The Rings** *rose in argument. Dewi Ap Evan of Caerphilly, Hugh Boggit of Newtown Abbey and John the Taylor of Portstewart, all fell upon Thorne of Mansfield in a quarrel over the way to enter the Morona Gate. All know the clue which tells the traveller to use pepper but none could find the spice.*

Prising them apart, I cautioned them to search carefully at Featherwop Beacon where there is a stone. Examine it, lift it if you will and then be sure to look before you leave. When you have the pepper drop it at the gate. So much discord for a little thing!

When he had recovered, Thorne of Mansfield came over to help me with Alex de Keresley of Coventry. This wanderer had entered Tylon's bedchamber in **Kentilla.** *There stands a chest, inviting plunder but securely locked. Alex could find no key. "Simple", says Thorne, "examine the bedposts well. There's a key there. Before unlocking the chest, strengthen it by dipping it in a precious liquid. All will then be yours."*

Richard the Black had found himself in deep water in the same quest. Way out on the perilous Serpent Sea he was, with a leaky boat. If you have a cup or silver chalice handy you can bail the water out and proceed in safety.

A problem of codes beset Gary 006 of Scunthorpe. In the **Fourth Protocol** *he could find no way to decipher or understand the one-time pads. When your code is given to you early in the search write down the numbers. Take the first number and then count horizontally across the letter grids. Thus the first letter of the second line corresponds to 27. The second letter of that same line will be 28 and so on. Count the letters until you reach that which corresponds to the number you have. Now you have the first letter deciphered.*

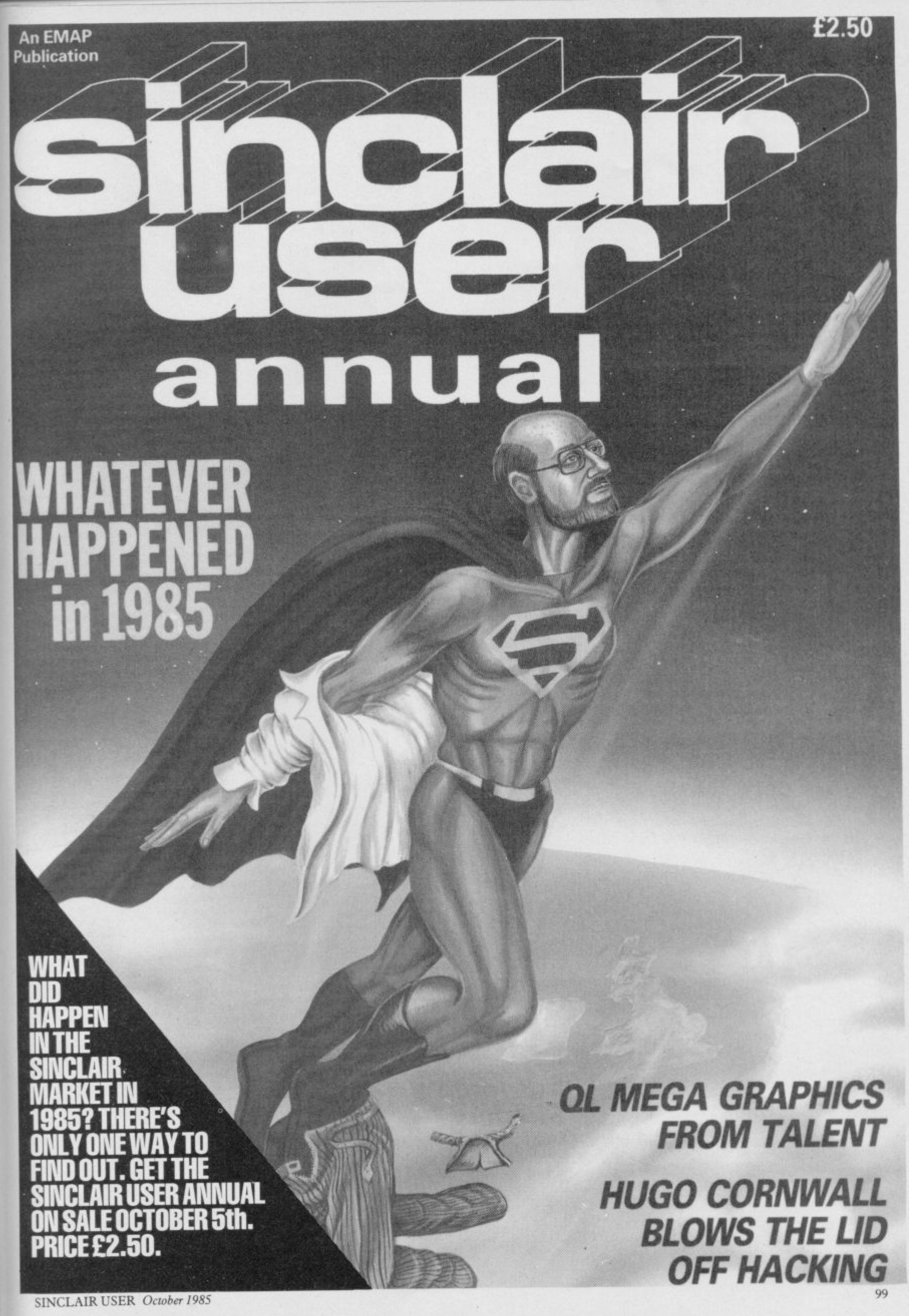
Five Best Shaw of Maidstone, dressed most sweatily in a tracksuit, complained to me that his search for status and wealth in **Hampstead** *had failed. Penniless in Piccadilly he is, and can raise no cash. Before you travel to Waterloo take a well earned rest upon a bench on Hampstead Heath. Examining that spot well may give you access to a flexible friend.*

After such an exhausting night sleep came easily to me, though as I dropped off I spied Iubba stealthily creeping behind a barrack block. Close behind him in the shadows were Zul and Zel, peering intently. I have some strange companions indeed. Farewell friends.

Greatbelly

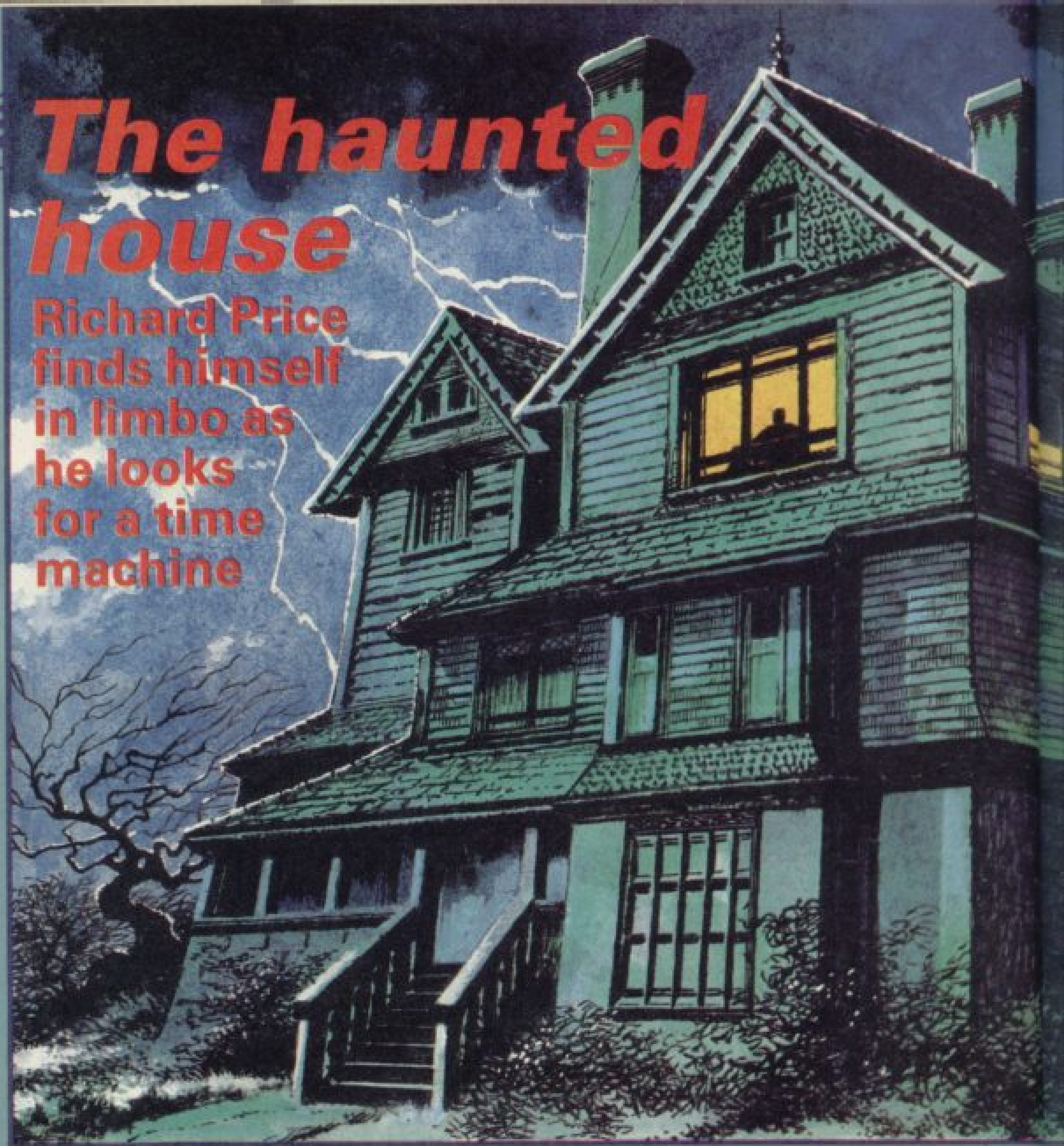
Gordo Greatbelly, Landlord

If your have a tale to tell, or are in need of a helping hand, write to the Landlord of the Dancing Ogre c/o Sinclair User, Priory Court, 30-32 Farringdon Lane, London EC1R 5BH.


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The haunted house

Richard Price finds himself in limbo as he looks for a time machine



MOST MONTHS the games sent in for review tend to be a mixed bag and usually only one or two stand out from the general run of average productions. This month is exceptional as all five programs reviewed are either excellent, value for money, break new ground or restate old values. Whatever the depth of your pocket you should find at least one that suits you or your wallet.

Mordon's Quest

The large scale text-only game has gone underground lately and graphics have come forward as the favoured element in adventures. **Mordon's Quest** bucks this trend and is a welcome return, with long flavoursome descriptions and a vast feeling of space.

The program is a sequel to Melbourne House's **Classic Adventure** and is written by the same author, John Jones-Steele. There are over 150 locations and, according to the blurb, more than 400 words in the vocabulary. The presentation is a restful white text on a black background with your inputs scrolling up in yellow.

The quest begins in a strange and sparsely furnished house set in the swirling mists of a time limbo. Logical exploration reveals little at first but, if you are curious enough, a fall from a height will leave you nauseous and predisposed to concussed visions. So appears Mordon the Ancient One, swathed in light. He asks you to take on the search for the lost pieces of an immortality device — your success will save the universe from assured destruction.

With the aid of a transporter unit and torch you set off into the mists. Sure enough you quickly enter a steaming jungle full of ancient ruins. After passing the mandatory patch of quicksand, you will run into a cannibal pygmy who can be disposed of by making a weapon from the bits and pieces found lying around in the jungle. Don't forget the pygmy as you journey — the carnivorous plants can be placated by a spot of judicious feeding!

The search now begins in earnest and, though you will discover some treasure and the first part of Mordon's machine quite quickly, you'll need to put in some serious thinking to progress into the other areas of the game.

The descriptions are excellent, full of atmosphere and needing no pictures to help them. When you arrive at the temple in the heart of the ruinous city you see a lake . . . "you walk to the lake and dive in. After swimming for several minutes you find yourself at a small outcrop of black rock. Looking around you, you see the perfect circle of the lake, surrounded by the ruined city and in turn the lush jungle. As you view the scenery you feel almost as if you are standing at the centre of a beautiful all-seeing eye."

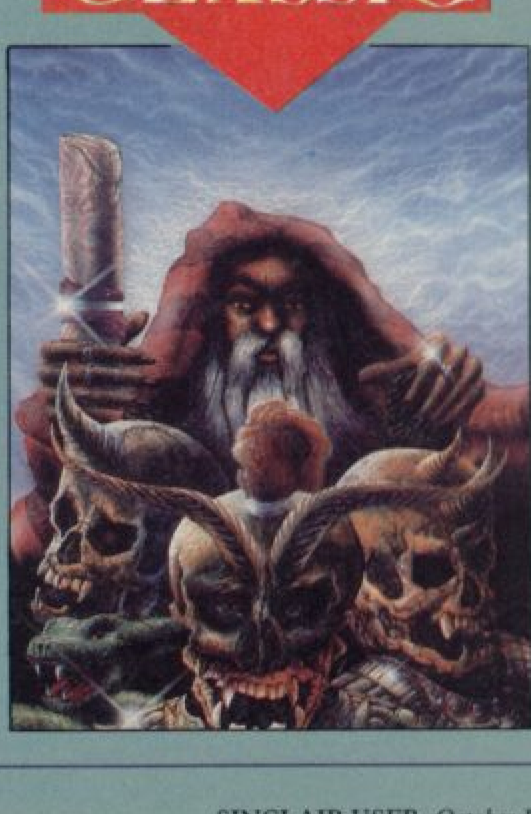
This literate and evocative text is typical of the game as a whole and the detail encourages exploration and experiment. I have no doubt that many clues are hidden in this wealth of description. Don't think of the lack of graphics as a loss — just give three cheers for text compression and expect some good hunting!

Sorderon's Shadow

Sorderon's Shadow — The Legend of Elindor is the most innovative of this month's selection. Beyond has consistently tried to push out the frontiers of games software and this latest program is no exception. In fact the scope of the game is so wide that it would be difficult to explain all its facets in such a small space.

The setting is the land of Elindor, much troubled by the evil of the sorcerer Sorderon. That wicked magus has blighted the land by his spells and the country is wasted by his minions and creatures. Krillan zombie warriors terrorise the people and other

SINCLAIR USER CLASSIC





half-human things haunt the landscape.

You are cast as the Un-named One, foretold in legend as the saviour of Elindor. To defeat Sorderon you must successfully accomplish nine major quests, all of which are subdivided into lesser tasks. Most of those tasks involve the enlisting of other characters, many of whom are hostile or indifferent to you. At other points you will need to reconstruct magical artifacts such as the Staff of Power, or trade items of power for others necessary to your purpose. The overthrow of Sorderon is no straightforward matter.

Your journey takes place in a landscape familiar to addicts of **Lords of Midnight** or **Doomdark's Revenge**. As you move from location to location the features shift in perspective and size on the screen. You can view the country from all eight major compass directions before deciding where you want to go. There are mountains, plains, lakes and forests. Within those you will discover tombs, huts, caves and other man-made places. Beyond claim over 4,000 locations and a staggering 33,000 screen views.

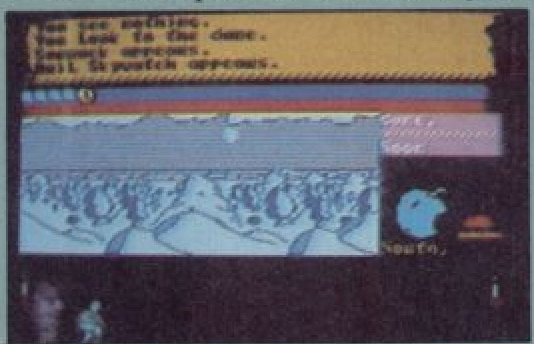
Commands are given in a variety of ways. By pressing Symbol Shift you can access a range of single key instructions. With those you can move, get an inventory, count your money, identify other characters, and carry out a number of other functions like scoring, saving and so on. There is also a full text interpreter which allows you to play the game as a text adventure too. That takes the program beyond the systems used in **Lords of Midnight** and provides a wide variety of choice for your approach to the game.

The interpreter shows the results of your actions on a scroll above the landscape and informs you of any problems in your input with an error message buffer. The screen also displays your strength — you'll need to find food — and shows small graphics of the characters who are with you in the location.

There are many other inhabitants of Elindor living their own lives around you in real time. You can speak to them and get them to help or do your bidding. You may, of course, need to fight them so you will have to be quick on the uptake.

Before you begin you will need to familiarise yourself with the very complex game format. There is a vast wodge of documentation with the cassette and I advise you to spend a fair bit of time taking it all in. The quests and sub-quests are very involved.

The first quest is to follow your



companion Morrin to the cave where a magical urn is secreted. The inscription on it will provide more clues to your task and Morrin then vanishes — you're on your own. My own first priority was to get used to the landscape — it took me a while to realise that wandering unprepared and unarmed was perilous, and I found myself being slaughtered regularly. Make sure you Save a position early on as you cannot simply quit and begin again — you have to load in a prepared set of data.

My review copy was a pre-production version and I ran into a few glitches in the program. At one point I typed 'Wait' — everything crashed and I couldn't get the game going again. The text interpreter kept telling me that my sentence lacked a verb when it clearly didn't. Fortunately, that did not affect the play much and it's worth remembering that there are very few other games which even possess that sort of error-trapping function.

Sorderon's Shadow is a heady blend of text adventure and strategy, and is a true successor to the realms of Midnight. I am sure that it will have a strong appeal to those who have clashed with Doomdark, and it should pull in many other text players who may have shied away from the military bias of those previous programs. In some ways it is experimental, but definitely shows the way forward for mixed format games. Good luck and don't talk to any strange lizards.

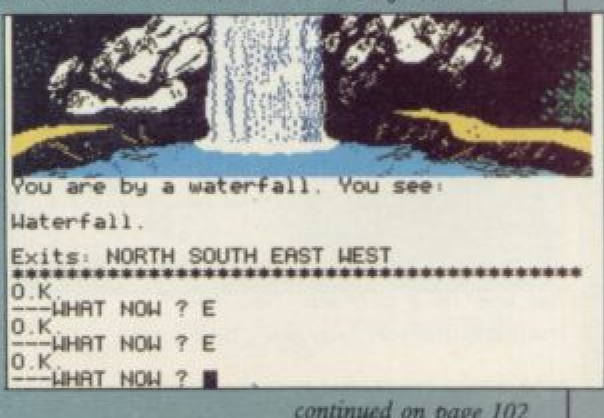
Robin of Sherwood

Sometime back in the Middle Ages the real Robin Hood began his career as the people's outlaw. Over the years he has undergone many transformations, and is nowadays portrayed as a freedom-fighter cum guerilla whose sole aim is to lift the yoke of Norman oppression from the Saxons' necks.

Robin of Sherwood from Adventure International is the computer spin-off from the TV series and portrays the new style Robin.

Like other Adventure International products, the game is mixed text and location graphics. A few of the pictures have some element of animation — such as the cascading waterfall — and are finely detailed, well drawn and very fast in appearing.

As in the TV series, you begin by finding yourself banged up in the sheriff's oubliette. To escape you will have to kill the guard and open the grating that pens you in. Adventure International feels that early achieve-



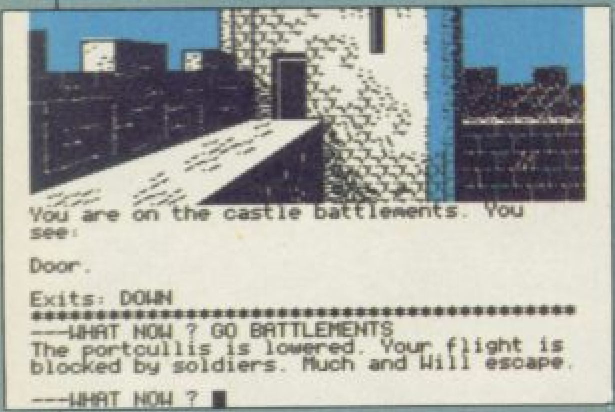
continued on page 102

Illustration: David Lloyd

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ment in an adventure helps to hook you into the game and the instruction sheet offers some useful coded help with that problem.

Once you've successfully broken out you should meet Herne the Hunter — Robin's godlike helper. He will



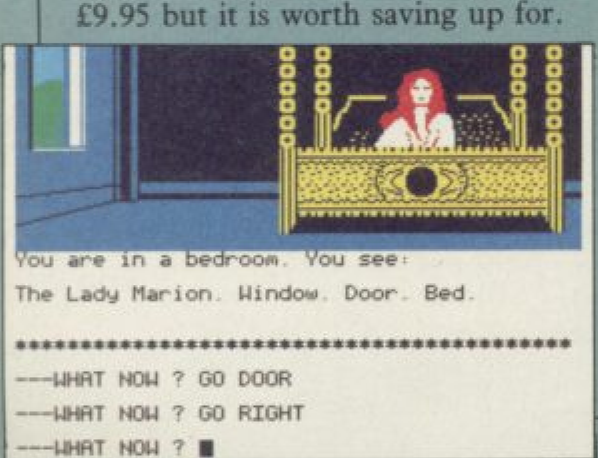
tell you to seek out the six Touchstones of Rhiannon. You will need to find your band and then explore the huge forest for clues and information.

Your adversaries include, naturally, the Sheriff of Nottingham and also Knights Templar, corrupt taxmen, venal Nuns and the extremely evil Simon De Belleme — the Crusader magician.

The problems rapidly become more complex and it seems that certain actions have to occur before others become possible. Until you have won the archery contest it's impossible to rescue Marion from the sorcerer, and it is very easy to be recaptured by the Sheriff if you make rash judgements.

Other characters will lay sub-quests on you — the Templars, for instance, will freely admit that they possess a stone but won't part with it until you have found their stolen Holy Crest. The Nuns offer to sell theirs for a lot of gold — all you have to do is go out and steal it. But where from?

I found the scenario compelling and the identification with Robin very easy given the fine graphics. It is good to see one of our own home-grown heroes in adventure action, and I thoroughly recommend **Robin of Sherwood** to all potential freedom-fighters. The game is a little pricey at £9.95 but it is worth saving up for.



The Secret of St Bride's

Regular readers of this column will know that I have a distinct partiality for odd storylines and original plots.

The Secret of St Bride's falls smack dab into that category. St Bride's is a real school in Ireland but its set up is like a girls' boarding school fifty years ago. The, er, more mature lady may enjoy spending a week or so there to see what a private school was like in that remote era.

This Quilled adventure, with location graphics, is set in that abode of learning and begins as Trixie Trinian arrives there for her hols. Having donned your gymslip you start to wonder just what on earth this odd place is about, with its ancient wirelesses and copies of newspapers from the 1920s.

Your main task is to find out what the secret of the school is and then return it to present day normality. Built into the game is a search for a mysterious amulet — almost a game in itself. Anyone discovering the Secret



will be awarded a St Bride's Certificate of Merit by the Games Mistresses who direct this bizarre school. I kid you not . . . it really exists!

Play commences in the dorm where your chums Fiona and Cynthia join in your hunt. An exploration of the school shows that all exits are blocked. Only the Forbidden Door offers a way out. Escape from here can be managed through a special Use command built into the game which helps to get round the two word input system of the Quill. By using a pencil and then placing it in the keyhole you'll get the key . . . there's slightly more to it than that but I shan't spoil your fun — write to the Fat One next door if you're stuck.

The Secret of St Bride's is humorous, well written and full of odd connections. It is a tongue in cheek romp through the realms of Angela Brazil — if you like the sound of it you should send your £6.95 to St Bride's School, Burtonport, County Donegal, Ireland. The Games Mistresses tell me they may have a distributor soon — keep an eye out for it.

Crystal Quest

Last, there's **Crystal Quest** from Pocket Money Software. This is a 100 location Quilled text adventure set in the world of *Star Trek*. The Earth is in serious danger and you must pilot your space craft where no man has gone before to find the three Crystals which will save the human race.

At the start you find yourself in the overheating engine room of the ship. The warp drive is due to malfunction so you have to race to the contol room and warp out of Earth base, pronto. There are steering systems to be mastered — if you get your colour coding wrong you could be in dead trouble and end up in a completely wrong destination.

Once you have learned how to steer the ship, you will find a variety of planets to explore — some with hostile alien life and some with robotic systems to contend with. You can use a transporter beam to get down to those landfalls but remember to set the coordinates before you beam down.

Trekkies will like the game as will anyone who can only afford a small amount of cash to buy their software. At 99 pence the program is terrific value for money, and compares very favourably with a lot of games costing five times as much. Beam me up Scotty!

Mordon's Quest
Publisher Melbourne House
Memory 48K **Price** £6.95
★★★★★

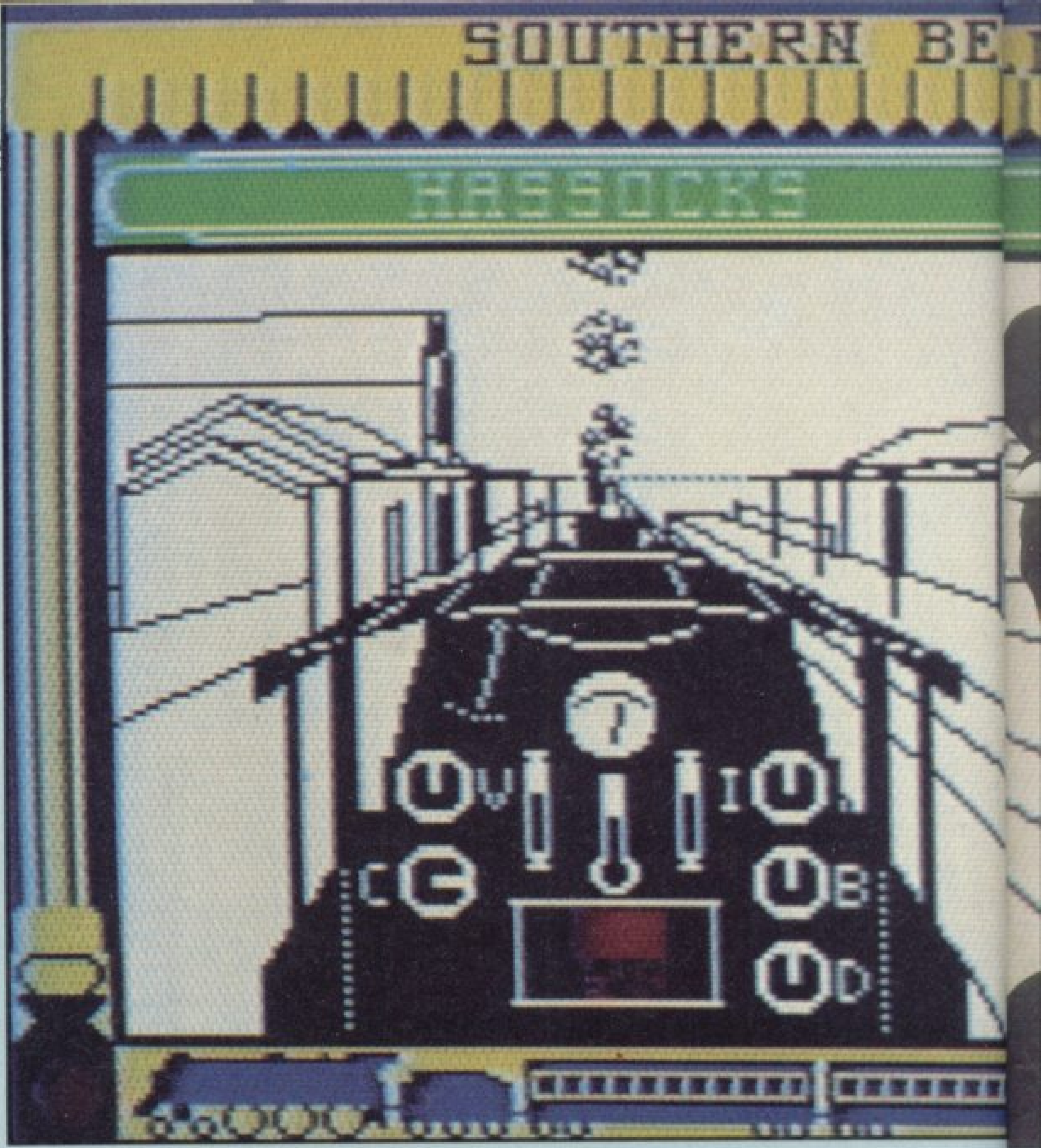
Sorderon's Shadow — The Legend of Elindor
Publisher Beyond Software
Memory 48K **Price** £9.95
★★★★★

Robin of Sherwood
Publisher Adventure International
Memory 48K **Price** £9.95
★★★★★

The Secret of St Bride's
Publisher St Bride's, Burtonport, County Donegal, Ireland
Memory 48K **Price** £6.95
★★★★★

Crystal Quest
Publisher Pocket Money Software
Memory 48K **Price** 99 pence
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The Hewson Express

FIVE YEARS is a long, long time in this business. Five years ago, the ZX-80 was hailed as a breakthrough at under £100. Five years ago, people were building Nascom computers from kits, and computer magazines, such as there were, printed listings of **Othello** for the UK101 or Acorn Atom.

The prince of machines was the Commodore PET. There were no Amstrads. No Orics. No VIC 20s, BBCs, MSXs, C64s, Spectrums or QLs. And there were no games. Computers were not supposed to be about playing games, bought off the shelf. They were about writing your own, because it was an interesting way of learning how to program. It was all very earnest, the obsessive hobby of a tiny minority. And one of the few, the very few, software companies to have started back then, and still going today is Hewson Consultants, now celebrating its fifth birthday.

Andrew Hewson is well known to readers of *Sinclair User* through his Helpline column, which has been informing, and occasionally baffling, folks with revelations about machine code ever since the magazine began. But he's also the founder, and managing director, of Hewson Consultants, set up on a shoestring in 1980, and now an expanding business infiltrating the charts with programs such as **Dragontorc** and **Southern Belle.**

Andrew's a chemical physicist by education — he did a degree at Sussex University. In 1972 he started working at the British Museum assessing the age of objects by radio carbon dating.

"In 1973 the Museum got a computer," says Andrew. "It was a big step forward. Businesses used computers for things like insurance, and doing gas bills and so on. But in the last ten years or so it's made an enormous difference to science." The museum was one of the first organisations outside the big universities to acquire a computer for research work, rather than as a filing or accounting system.

Since nobody at the Museum could program it, an expert was brought in to run it, and Andrew learned how to program from him. "I learned good habits," says Andrew. "You have to take it slowly when you program. It was a 16-bit Hewlett Packard with a 64K memory. The memory was a set of ferrite rings which lived in a drawer. We had a couple of tape drives, a disc drive and a printer, and the operating system had to work frantically to keep it all going."

After seven years at the Brit, Andrew joined NERC, one of those much-derided quangoes. He moved to Oxfordshire and is still there.

"I'd been up to Manchester with my boss, and on the way home we stopped off at the Wimpy in Stratford-Upon-Avon for a cuppa. He started talking about the ZX-80 and how wonderful it was." Andrew was not impressed. "I said, 'you must be joking!' and started listing all the reasons why the machine was awful. He said, 'look at the price'. And the penny dropped."

Andrew leans back, puts his hands behind his head, and explains how, if you wanted a system with any equipment — printers, discs or whatever — you needed about £2,000. "So I bought a ZX-80 and played around with it. You only get one life."

Right from the start it was business. Andrew was interested in making money, not acquiring a hobby. "I had a wife and two kids and a mortgage." He taps his head. "If I'm as clever as I think I am — no, that's not right. If you think 'I can do this', then there's an easy way to prove it."

What also made Andrew keen to set up his own business was an increasing dislike of the sort of organisation he was working for. "I learned that in fixed institutions, the job was never going to be more than it already was. Those places don't care if you spend ten years on some obscure project if it produces 'knowledge'. I got fed up



The unstoppable Hewson Consultants has been steaming ahead for half a decade. Chris Bourne talks to the man on the footplate

with it."

Andrew's one of those people who are concerned to analyse carefully what they do. "What isn't apparent to the public is the effect of government cutbacks and what it generates in the civil service. Look at the teachers — they're desperately anxious about the future of their profession. It was the same in government science departments.

"It's always difficult to look back on your own motives" he adds, cautiously.

So, Andrew hummed and hawed a bit and then got down to uncovering the innards of the ZX-80. "It was a breath of fresh air, the first computer I'd ever worked with where you could get at all of it. Usually you are given the ground rules — operating system, language and so on." What he means is the way you can inspect the ROM of Sinclair machines easily, and write directly in machine code.

Andrew's first move was logical. All his moves are logical. Having discovered the ROM he wrote a book, *Hints and Tips for the ZX-80*. "People were interested in books. That book was why I'm now doing the *Sinclair User* column. It's about things like clearing a part of the display, or how variables are stored."

Hewson Consultants was thus formed on a mere £500 of capital. The consultant part was because Andrew also did some consultancy work. Logical, remember.

The book was a success, and became *Hints and Tips for the ZX-81* when that computer was released. By November of 1981, Andrew was working incredibly long hours, splitting his time between NERC and the new business, with help from his wife, Janet. It was then that his brother Gordon joined the business as Sales Director to take some of the administrative load off Andrew's shoulders.

Utilities were the thing in those days. The home computer market was supposed to be stuffed with would-be programmers — a real hobbyist's market. Andrew brought out **Programmer's Toolkit for the ZX-81.**

Virtually all companies receive bundles of unsolicited games from programmers, and that's how Mike Male got involved. He was an air traffic controller at Heathrow, and sent in a flight simulation called **Pilot.** It was very slow. John Hardman sent n **Puckman** "in just the same way. It sold quite nicely, thank you."

All the games were sold mail order and duplicated the hard way. On a cassette deck, by hand.

Nineteen eighty-two began as the year of the RAM pack and Andrew bought in a load of them to sell. It ended as the year of the Spectrum. By then Hewson Consultants had a proper office, a scruffy little place in Wallingford. Andrew, true to form, decided he was going to write a book about the Spectrum.

"People then were avid to know how things worked. Books can no longer carry them forward — but when people ask, 'what can I do with my computer?' they still go down to WH Smith."

Andrew worked night and day, he says, to complete *20 Best Programs for the Sinclair Spectrum*. "You know what listings are like," says Andrew, sympathising with our own problems at *Sinclair User* in trying to help people type them in correctly. "We still get people phoning up about **Index File.**"

Mike Male was now working on **Nightflite** and **Heathrow Air Traffic Control,** still beavering away at simulating flight one way or the other. The system at Hewson involves giving programmers their head. If the first game is successful, a new one is immediately discussed. According to Andrew, being good to your authors is one of the most important aspects of maintaining a sound business base.

"It's very easy to find people who'll write software. It's very difficult to find someone who can write good software. We've grown and prospered by keeping faith with our authors." That means if Mike wants to write simulations, Andrew won't try and force him to do arcade games.

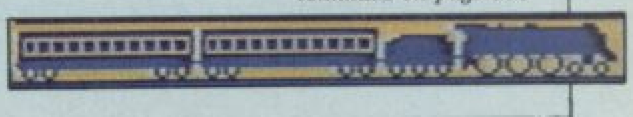
At about the same time, Kim Topley was writing **Quest,** a text adventure with pictures. **Quest** is surely one of the most underrated of adventures — a role-playing game with spells, weapons, and extremely difficult problems. It's main failing is that it's slow — you have to wait for minutes to build up your energy if you get wounded, and there is no way of restarting a lost game. Kim followed up **Quest** with **Fantasia Diamond,** a wacky number with plenty of humour which probably went down better.

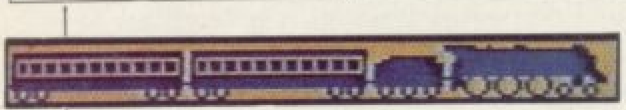
With such a wide range of products already out, most companies might have regarded themselves as home and dry. Ready for the Porsche, and the long summer break in the Bahamas. Not Andrew.

"It wasn't until 1983 that we seriously believed this hula-hoop craze was strong enough to build an entire business around. We decided to take it seriously. I left NERC in mid-83 and by the end of that year we were bursting out of Wallingford. Shipping out tapes for Christmas was exciting but also murder."

So the company moved to bigger premises on a Didcot industrial estate, and installed a duplicating plant which had been bought earlier. "We did it because we couldn't get guaranteed supplies of our software. I'd say it was the right decision for the future." Hewson is one of the very few software houses who do this — most use

continued on page 108





continued from page 107

commerical duplicating firms.

"From my experience in laboratories, I knew equipment was not a doddle. It never is. Our father is another chemist, and although he knew it wouldn't be easy, he was prepared to take it on. It works because of a combination of money, the right reason, and the key person to do it."

The plant starts with an ordinary, battered, cheap cassette deck. The program is loaded into the Spectrum



Programmers Mike Male and Bob Hillyer

from that, and then SAVEd to a reel-to-reel ReVox tape deck. That master tape sends the program to the Binmaster machine, which sends cassette tape flying through a series of heads and rollers at high speed, duplicating the program. That tape settles in bins, and a 'wodge' is put on the tape to mark the end of each program. Another machine delivers blank cassettes containing nothing but transparent head tape, which it cuts, splices in the program tape, cuts at the 'wodge', splices again, and drops into a box. The final stage is to stick on the labels with a solvent and pack them up.

In August of 1983 Steve Turner arrived. He's the man behind **Avalon** and **Dragontorc,** and the masterly graphics system which leads Andrew to talk about computer movies with uncharacteristic enthusiasm. Usually he makes quietly deprecating comments such as 'we did all right with that' or 'it's a nice little program.'

Steve, by pure coincidence, went to the same school as Andrew. One feature of all Hewson's authors is their comparatively high age. "Whiz kids may be all the fashion," says Andrew, "but Mike, Kim and Steve are all in their thirties. they don't give up until a program is 105 per cent complete. That's experience showing through."

Steve produced a series of 3D space games first — **Seiddab Attack, Space Wars** and **Lunattack.** Andrew admits now that as games, they were not overly successful or particularly good, but the programming was rather more sophisticated than met the eye. "Steve's series built a base, and a strategy, to carry him forward. **Avalon** and **Dragontorc** came out of the wireframe graphics system on the **Space Wars** series."

The entire history of Hewson Consultants, though without any of the spectacular failures of many companies, is like a microcosm of the software industry generally. Every produce has been precisely the sort of program, or book, which fitted the market as it existed. **Avalon** and **Dragontorc** are Hewson's response to the demand for arcade-adventure hybrids, still high and apparently unabated. But keeping up with the times is not the whole story. Andrew and Gordon both insist on the need for quality and atmosphere in games. "What happens in a book?" asks Andrew, getting all philosophical after his lunch. "You know it's good because of an image that stays in your mind. We can't produce Hollywood special effects, but the same things apply in different moods to other styles. And the authors are very important — we always promote them as themselves. The Hewson name is simply a guarantee of standard."

Southern Belle, the train simulation, had been at the back of Mike Male's mind for some time, and after he finished a new version of **Heathrow ATC** he teamed up with a friend of his — a railway buff. While nothing has yet been decided, it seems likely that **Southern Belle** will spawn other, railway-related simulations in the future. Andrew's been pleasantly surprised by the response so far. He claims he's had a phone call from one customer who said he'd bought a Spectrum simply in order to play it.

That brings the lengthy saga up the present. Hewson now employs a team of four in-house programmers, working on conversions and such products as an assembler, **Zapp,** for the Amstrad. The main authors remain freelance. Programming is always done on the machine the game is for.

In future we can expect to see another Steve Turner game, **Astroclone,** "sort of Maroc in the 23rd Century." The idea is to take the graphics and game ideas of the **Avalon** series into a science fiction setting.

There's also **Sphinx,** about which Andrew is more reticent. He says it's going to be a "scrolling multi-character adventure with a recognisably different graphics system." That's being written by a new face at Hewson's, Mark Goodall.

There's a tremendous diversity in products at Hewson's, but the key is surely in the simple, unassuming professionalism of the entire outfit. "It's a rather boring story," says Andrew, "I'm not sure if it's really what your readers want to hear."



The Hewson team

The story may not be full of spectacular successes and close squeaks with disaster, but the achievement of producing, slowly but surely, what Andrew describes as "the complete software publishers" from £500 and a ZX-80 is reassuring in such a volatile industry. See you for your tenth birthday, Andrew — and keep the Helplines coming.

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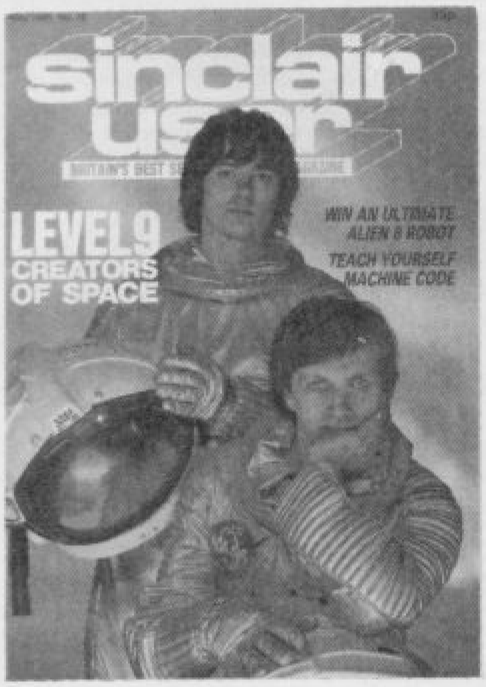
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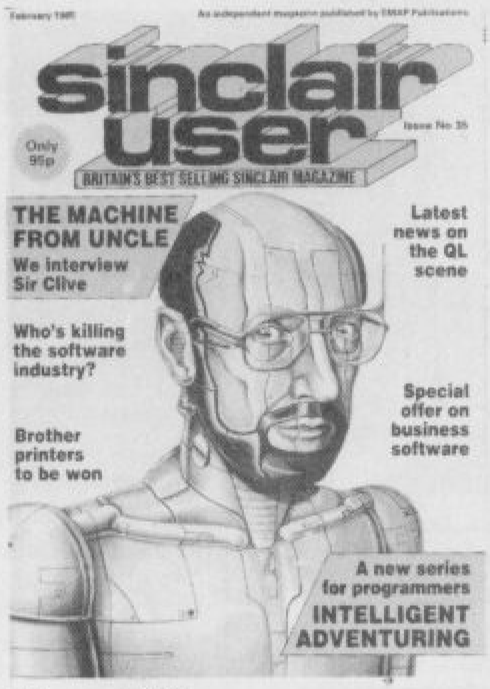
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Day of the rats

Down in the sewers the rats are stirring. Dare you face the menace in its lair?

RELIVE your worst nightmares battling the dark, furred menace of the Rats. Horror writer James Herbert's best-selling story, *The Rats*, has now been transferred to the Spectrum by Hodder and Stoughton.

A combination of strategy and adventure, it puts you in the shoes of the major characters of the book: Foskins, the civil servant who must plan the campaign to save London from the rats, and Harris, tough and resourceful, whose confrontation with the rats in their sinister lair forms the novel's climax.

The Rats has already won our *Sinclair User* Classic award, and is reviewed elsewhere in this issue. And now Hodder and Stoughton is giving away 100 copies of the game to the winners of our exclusive Rats competition.

All you have to do is solve a simple maze puzzle, explained opposite, and then prepare yourself for the slobbering, crunching, blood-spattered, plague-ridden squealing vileness of . . . **The Rats.**



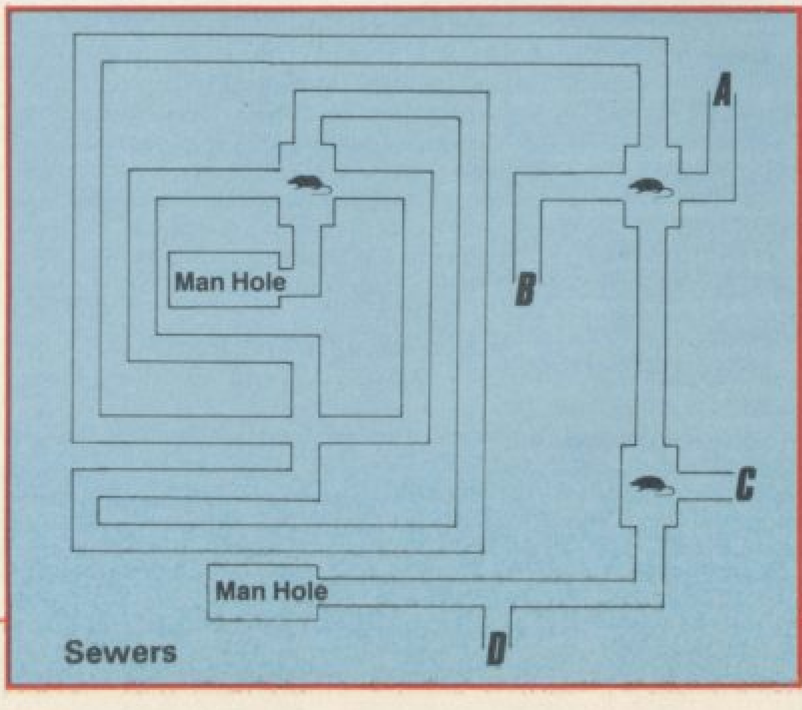
Foskins is trapped in the tunnels under London's sewers, and you, as Harris, must rescue him from the rats. The two maps below show the network of sewers and the tunnels beneath them. There are two manholes by which you can enter the sewers, and four connections — A, B, C and D — between the sewers and the rat tunnels.

The problem is, the network is infested by the killer rats. You can sneak past them if you take them by surprise, but you'll never make it once they are alert.

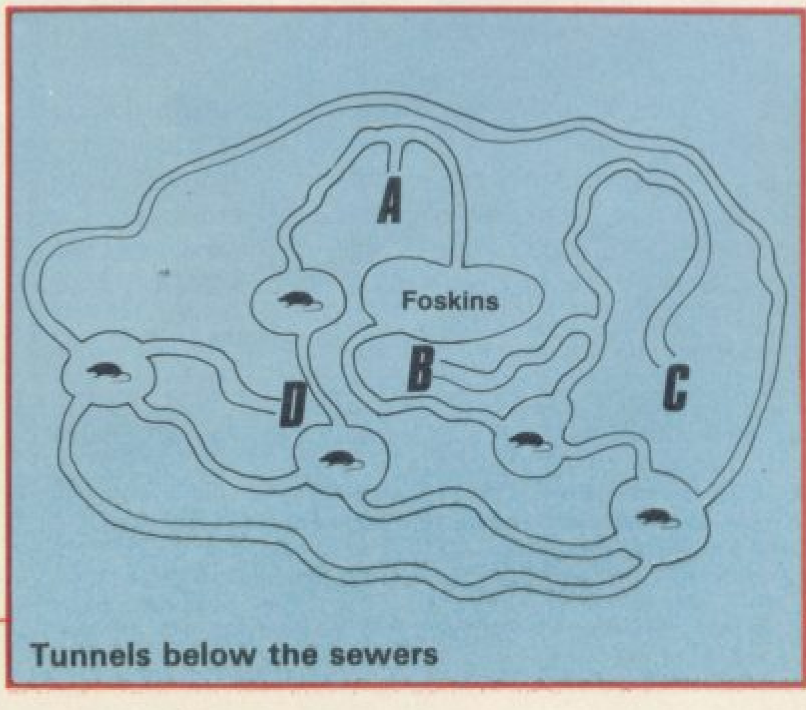
So, what's the smallest number of rats you'll have to pass to get to Foskins, and then get back out of the complex into the open air again? Remember, you can't pass the same rat twice. You can enter by whichever manhole you choose.

The rats are stirring in their underground burrows, and time is running out for all of London.

When you've solved the puzzle, write the answer — the smallest number of rats you have to pass — on a postcard along with your name and address. Send it to Rats Competition, *Sinclair User*, Priory Court, 30-32 Farringdon Lane, London EC1R 3AU by Friday, October 18. Employees of EMAP or Hodder and Stoughton are not allowed to enter. Only one entry per person is permitted.



Sewers



Tunnels below the sewers

Sinclair spares and repairs



IF, LIKE MANY other Spectrum owners, you find one day that your computer has died, you will have a major problem on your hands. Phoning the Sinclair Research customer relations department in Camberley will not help very much either.

If your electronics knowledge is limited, then you will decide to send your Spectrum to one of the companies who specialise in repairing computers. If you have a good working knowledge of electronics then the addresses listed below should enable you to obtain most replacement parts to repair your computer. Some of the simpler repairs, such as those involving keyboards can be undertaken by those with limited knowledge.

If your computer is under guarantee then it is important that you do not invalidate that guarantee. Talk to the customer service division at Sinclair Research and they will tell you where to send it. When returning the computer put a note in describing the fault as briefly as possible, as this will speed the repair process.

Suppliers of Sinclair parts:

Adaptors and Eliminators, 14 Thames Street, Louth, Lincolnshire. (050782) 8011. Spectrum and ZX-81 power supplies.
ASTEC (UK), 16 Albury Close, Reading, Berkshire. (0734) 53067. Supplies modulators for all countries PAL, NTSC, SECAM.
CPC, 194-200 North Road, Preston, Lancashire. (0772) 555034. Supplies all parts for Spectrum, ZX-81, ZX printer, ZX RAM pack including all case parts, power supplies and keyboard parts. Probably the best place to get ULA, ROM, case parts and keyboard.
Ferranti Semiconductors, Computer Road, Hollinwood Avenue, Oldham, Lancashire. (061) 682 6844, (061) 624 0515/6661. Supplies Spectrum and ZX-81 ULA.
Maplin Electronics, Southend on Sea, Essex. (0702) 552961. Supplies general components and data and technical books.
National Semiconductors (UK) Ltd, 301 Harpur Centre, Horne Lane, Bedford. (0234) 47147. Supplies Spectrum RAM/74LS series TTL; LM 1889 video chip.
NEC (UK) Ltd, Block 3, Carfin Industrial Estate, Motherwell. (0698) 73221. Supplies Spectrum ROM and RAM/74LS TTL; Z80A.
Sinclair Research Ltd, Camberley, Surrey. (0276) 685311.
Texas Instruments, Manton Lane, Bedford, Bedfordshire. (0234) 223000, (0234) 211655. Supplies RAM 4116, 4532, 4164, 74LS TTL (Spectrum).
Timex Corporation, Camperdown Plant, Harrison Road, Dundee, Tayside. (0382) 819211. Makers of Spectrum, ZX-81, Printer, Interface one, Microdrives, RAM Pack. Repair and service for Sinclair.
Verran (Computerfix), Units 2H & 2J, Albany Park, Frimley Road, Camberley, Surrey. (0276) 66266. Repairs Spectrums and ZX-81.
Zilog (UK) Ltd, Zilog House, 45-53 Moorbridge Road, Maidenhead, Berkshire. (0628) 39200. Supplies Z80A.

Component companies

SOME OF THE large companies mentioned above do not like dealing directly with the public. The following is a list of component companies which should be happy to deal with you. Most will have catalogues available and will supply data sheets for their products on demand.

These firms are only distributors and they do not make components. If you have a problem with a particular device contact the manufacturer as listed above because not many of the distributors can answer technical questions; RS Components, Farnell, Ambitt and Hawkes may do. Anyone needing NEC parts should phone them direct and ask for some distributors dealing with them.

Abacus Electronics, Kennet House, Pembroke Road, Reading, Berkshire. (0734) 33311. Makes dealt with: National Semiconductors, SGS.
Access Electronic Components Ltd, Austin House, Bridge Street, Hitchen, Hertfordshire. (0462) 57244. Makes dealt with: National Semiconductors.
Alpha Electronic Components Ltd, 66 Wilbury Way, Hitchin, Hertfordshire. (0462) 57244. Makes dealt with: National Semiconductors.
AM Lock Distribution Ltd, Nevill Street, Middleton Road, Oldham, Lancashire. (061) 652 0431. Makes dealt with: Motorola, Mostek.
Anzac Components Ltd, Burnham Lane, Slough, Buckinghamshire. (06286) 4701. Makes dealt with: Hitachi.
Axion Electronics Ltd, Unit F, Turnpike Road, Cressex Industrial Estate, High Wycombe, Buckinghamshire. (0494) 442181. Makes dealt with: Motorola.
BA Electronics Ltd, Millbrook Road, Yate, Bristol. (0454) 315824. Makes dealt with: Texas Instruments.
Celdis Ltd, 37-39 Loverrock Road, Reading, Berkshire. (0734) 585171. Makes dealt with: Motorola, Mostek.
Crellon Electronics Ltd, 380 Bath Road, Slough, Berkshire. (06286) 4434. Makes dealt with: Motorola, SGS, Zilog.
Dialogue Distribution Ltd, Watchmore Road, Camberley, Surrey. (0276) 682001. Makes dealt with: Hitachi.
DTV Group, 10-12 Earnest Avenue, West Norwood, London SE27. (01) 670 6166. Makes dealt with: National Semiconductors.
Farnell Electronic Components Ltd, Canal Road, Leeds. (0532) 636311. Makes dealt with: Hitachi, National Semiconductors.
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STC Electronics, Edinburgh Way, Harlow, Essex. (0279) 26777. Makes dealt with: Motorola, National Semiconductors, SGS, Texas Instruments and Hitachi.

Computer parts

Z80A: Zilog, SGS, NEC (Spectrum/ZX-81).
ULA: Ferranti (Spectrum/ZX-81).
ROM: Hitachi, NEC (Spectrum), Mostek, Motorola (ZX-81).
RAM: 4116 type — NEC, National Semiconductors, Texas Instruments, ITT (Spectrum). 4532 type — Texas Instruments, OKI (Manhattan Skyline) (Spectrum). 2114 type — Motorola, NEC (ZX-81). 4118 type — Mostek (ZX-81). 2K type — Mostek, Toshiba, Motorola, Texas Instruments, NEC (ZX-81).
LM1889: ICI4 — National Semiconductors (Spectrum).
TTL: 74LS00/74LS32/74LS157 — Texas Instruments, SGS, Motorola, National Semiconductors, NEC.

The following are all used on the 48K Spectrum.

Regulator: LM7805 +5V Reg. — SGS, NEC, Texas Instruments, Motorola.
Crystals, Capacitors, Resistors, Diodes, Sockets: available through general component suppliers.
Modulator: UM1233 Astec (UK) Ltd.
Leads: available at most TV/electrical shops.
Case parts: Sendale Plastics.
Keyboard: CPC.

Learning machine code? Andrew Hewson shows how the Z80 registers operate



Registering a pair of numbers

THIS MONTH I am devoting the whole of this column to a discussion of the various Z80 registers, in response to a letter from Brian Sedgewick of Hartlepool: **I am told that registers are like variables in Basic. Can you explain how?**

A computer does not alter the contents of memory directly when it is executing a machine code program. It copies the contents of a location in memory into one of a number of special locations within the microprocessor, called registers, and then operates on the contents of the register. It is true that registers have a similar function in machine language to that of variables in Basic, in that they are used to store numbers and can be used to control a decision, but the comparison is by no means exact. They differ from Basic variables in that they are limited in number and they exist within the processor itself.

The Z80A is a powerful microprocessor because it has several registers and can hold several numbers at once, thereby reducing the need to make time-consuming transfers between the processor and memory.

The accumulator is the most important register because most of the arithmetic instructions, like addition and the logical instructions — logical OR — operate on the contents of that register.

Some of the instructions which refer to the accumulator use a second register, or a memory address as a source of data. For example, 'add a,b' instructs the processor to add the contents of the 'b' register to the 'a' register, leaving the result in 'a'.

Most of the registers occur in pairs in the sense that some instructions operate on two registers together. The 'f', or flag register, is paired with the 'a' register in that sense, although the link is rather tenuous as it is limited to the PUSH, POP and exchange.

The 'f' register is rather different from the others, because the eight individual bits in the register are used as so-called flags to record and control the sequence of program execution. Each flag is used to indicate that either one of two logically opposite events has occurred, for instance, the zero flag indicates whether the result of the last addition or subtraction was zero. Only four of the eight flags are of interest to most users. Their features are summarised in table one.

The sign flag is the simplest. By convention, if a byte is being used to represent a signed number then bit seven is used to hold that sign, being set when the number is negative and reset otherwise. The sign flag reflects the sign of the last result.

The zero flag is set if the result of the last operation is zero. It is also used by comparison instructions which are, in effect, subtraction instructions for which the result is discarded.

The carry flag records the overflow which occurs if the result of an addition is too large to record in the register and if a borrow occurs on subtraction. There are also some rotation instructions in which the bits in a register are rotated to the left or to the right, with bits seven and zero being rotated to or from the carry flag.

The parity/overflow flag is really two flags in one. It is used as an overflow flag by arithmetic instructions to indicate if bit seven has been affected by a carry or a borrow generated by bit six. Logical instructions use the same flag to indicate the parity of the result. The parity of a binary number is the number of bits set to one — if the number is even the parity is said to be even, if it is odd, the parity is said to be odd.

The effect of some instructions depends on the current setting of particular flags. For example, the instruction:

```
jr z,d
```

causes the Z80A to jump over the next 'd' instructions if the zero flag is set. If the zero flag is not set, the processor executes the next instruction in sequence as usual. Thus the flag register is important because it allows the processor to make decisions and branch to

continued on page 116

continued from page 115

another part of the program.

The 'b' register, and to some extent the 'c' register with which it is paired, is available for a number of purposes but its most important use is as a counter. We have already seen how the flow of a program can be controlled by the use of the zero flag in the 'jr z,d' instruction. Another instruction:

djnz d

also uses the zero flag to allow loops to be constructed in machine code, using 'b' as a counter in an analogous fashion to FOR-NEXT loops in Basic.

When the instruction is encountered, the Z80A decrements the contents of the 'b' register — reduces the contents by one. If the result is zero then the next instruction in the sequence is executed. If the result is not zero the routine jumps 'd' instructions. If the programmer uses a negative value for 'd', the jump goes back earlier in the program and assuming there are no other branches, the processor will eventually encounter the same instruction again. Thus by loading the 'b' register with a suitable value initially, and setting the displacement — 'd' — appropriately, a section of code can be executed a given number of times.

The 'b' register holds one byte only, and so it can be set to any number between zero and a maximum of 255. Hence at most, 255 passes can be made through the same section of code using that mechanism.

There are no similar facilities for making more than 255 passes through a loop, but there are a limited number of powerful instructions which use all 16 bits of the 'bc' register pair as a counter up to 65535. An example is the instruction:

cpdr

When it is encountered, the Z80A decrements 'bc' by one, decrements the contents of 'hl' — hl is another register pair — and compares the contents of the accumulator, 'a', with the contents of the location in memory whose address is held in 'hl'.

The processor repeats those actions until either a match is found between 'a' and the memory contents or until bc = 0. Thus, that instruction can be used to search for an address containing a particular number.

The 'd' and 'e' registers do not have any individual function and are mostly used as temporary, rapidly accessible memory. They may also be used together, to hold the address of a location in memory.

The main function of the 'h' and 'l' registers is to hold the address of a location in memory and we have already seen how the 'cpdr' instruction makes use of 'hl' for that purpose; 'h' stands for high byte and 'l' stands for low byte, and the address is held in the form:

address = 256★h + 1

giving a maximum of 65536 unique addresses — 0 to 65535 inclusive.

The 'ix' and 'iy' registers are each 16-bit registers and can be used only as such, in contrast to the 'bc', 'de' and 'hl' registers which can be used in pairs as 16-bit registers or individually as eight-bit registers; 'ix' and 'iy' are generally used in a similar fashion to the 'hl' register pair, although the instructions which drive them require one more byte of storage. For example:

add hl, bc

is a one byte instruction which causes the Z80A to add the contents of the 'hl' and 'bc' register pairs and leave the result in 'hl'. The same instruction using 'ix':

add ix, bc

is a two byte instruction.

The register pairs, 'ix' and 'iy', have one further property which is not available to 'hl', and that is that they can be used with a displacement, 'd'. That means an instruction which references 'ix + d' does not use the memory location whose address is held in 'ix'. Rather, 'd' is added to the value in 'ix' to give a new address and the instruction then uses the corresponding memory location.

The stack is an area at or near the top of RAM which is used for the temporary storage of the contents of register pairs. It is designed to grow down the RAM as it is filled and to shrink back up the RAM as it is emptied. The address of the current location of the top of the stack is held in the 'sp' register.

Transfers to and from the stack are made by means of PUSH and POP instructions. For example:

PUSH hl

causes the processor to: decrement 'sp'; copy the contents of 'h' to the location pointed to by 'sp'; decrement 'sp'; copy the contents of 'l' to the location pointed to by 'sp'.

The POP instruction is the exact reverse. In this manner the most recent pair of values pushed on to the stack are always the values which are POPped off again. Provided the register pairs are POPped in the reverse order to that in which they were originally PUSHed, no problems will arise.

Flag	Mnemonic	Mnemonic when reset	Use
Sign	M	P	Set when the last result is negative.
Zero	Z	NZ	Set when the last result is zero or a match occurred.
Carry	C	NC	Set when the last result is too large to be fully recorded in one byte — or two bytes for operations on register pairs.
Parity/ Overflow	PE	PO	Parity — set when the last result has odd parity. Overflow — set when an operation changes bit seven as a result of an overflow from other bits.

Table 1. The four flags which control most of the operations of the Z80A

The program counter, 'pc', is a very important 16-bit register because it holds the address in memory of the next instruction to be executed.

The normal flow of events when an instruction is executed is as follows. Copy the contents of the location pointed to by 'pc' into a special register within the processor. If the instruction is held in several bytes, increment 'pc' and copy the contents of the next location into a second special register. Increment 'pc' so that it points to the next instruction to be executed. Execute the instruction which has just been copied in.

A jump instruction such as 'djnz d' or 'jr z,d' alters the normal flow of events by altering 'pc' during the last step. Note that that alteration occurs after 'pc' has been incremented, so the value of a displacement, 'd', should always be calculated relative to the position of the instruction following the one containing the displacement.

The Z80A possesses duplicates of each of the 'a', 'b', 'c', 'd', 'e', 'h' and 'l' registers. The duplicates are distinguished by the use of a prime — for example, 'a'' is the duplicate 'a' register. No instructions operate on those duplicates directly, but exchange instructions are available to swap two or more registers out of use and to bring their duplicates into use.

Exchange instructions are executed very rapidly. The contents are not physically copied from one register to the other. Rather a set of internal switches is changed, so that the prime register is used by subsequent instructions and the original register becomes dormant.

Shadowing the ROM



EXPLOITATION of Interface One has been minimal but Melbourne House hopes to put that right with its new book, *Spectrum Shadow ROM Disassembly* by Gianluca Carri.

The book opens with a brief introduction to the use of hook codes and a description of those which can easily be used from Basic. They include accepting a character from the keyboard, and a test for key depression.

Carri devotes a section of the book to his extensions of Spectrum Basic. They allow you to POKE strings of characters into memory, add line numbers to the Basic EDIT command, speed up the microdrive CATalogue and produce pseudo-random file handling.

Each shortroutine is listed in assembly code format so you will need an assembler to enter it. The author has included a Basic loader program for those who do not want to enter the assembly code, which means that a long list of numbers has to be entered — such a process is prone to error.

Although the author shows how each of his new commands operate, together with information about how the machine code extensions work, he does not explain how they are patched into the Basic Operating System. As a result, the book only provides ready to run listings and not much new information for readers who want to get to the heart of the Shadow ROM.

The third, and most important, section is devoted to a complete disassembly of the Interface One ROM. The assembly language listing is split into subroutines.

Each routine is explained in a short paragraph and descriptions of each line of code are given opposite the appropriate line of the routine. An appendix at the back lists all the ROM routines together with corresponding entry points.

Carri has also included appendices on system variables, labels and how to tell whether you have got a ROM1 or ROM2. The technicalities involved may easily put off a beginner, but the book could be regarded as a source of reference for machine code programmers.

John Gilbert

Spectrum Shadow ROM Disassembly
Publisher Melbourne House
Price £8.95 (paperback)
★★★★

Learning with pictures

IF YOU ARE not the sort of person who likes being lectured, *Illustrating Super-Basic on the Sinclair QL*, by Donald Alcock, should please you.

The book looks as if it has been hand written and contains hundreds of pictures and diagrams.

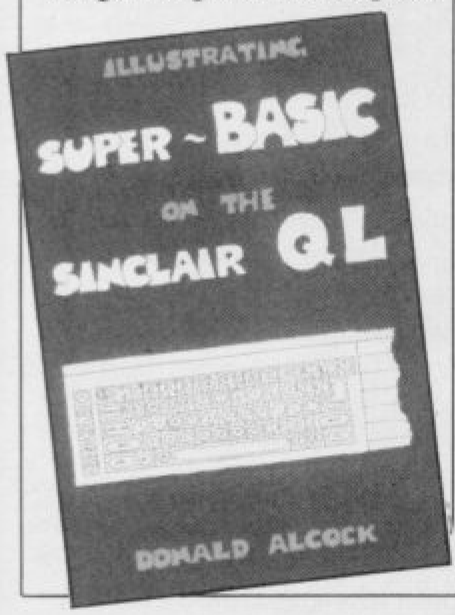
Each major topic is given one section. The author starts with introductory examples, showing how the QL line editor works and finishes with a look at the direct entry of commands.

At the end, Alcock has included an appendix of funny smells: things that don't work as expected or contradict the user guide.

If the text had been printed in normal type and diagrams given more space, the book would be ideal for beginners. As it is, you should think twice before purchasing it.

John Gilbert

Illustrating SuperBasic on the Sinclair QL
Publisher Cambridge University Press
Price £5.95 (paperback)
★★★



Keep it in the family

NOT ANOTHER general book about computers disguised as something which all the family can read!

According to the publisher, *The Family Computer Book* by Richard Graves and Andrew Thomson, is for the 99 per cent of home computer owners who buy their micros for educational and practical reasons.

The first chapter shows how to buy a computer. Only three computer manufacturers — Acorn, Sinclair and Commodore — are mentioned. Nine pages are then used up with information about where to place the machine, plugging in the television, and playing the introductory tape.

The section on the impact of a computer on family life is classic stuff. No review would be complete without a quote from a poem included on those pages.

"Computer, Computer,
how hateful that thing
One day in frustration I'll
smash you right in."

How can you follow such a poem? The authors manage to introduce PRINTing, INPUT and arrays, but little else.

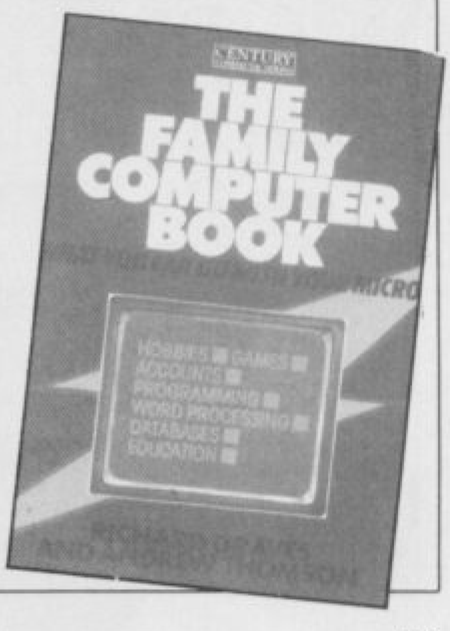
The other sections are similar to the section about buying a computer. They include advice on family accounts.

At the end of the book is a section about extending your system. Voice synthesisers, joysticks, and home robots are dealt with in too quick and concise a way.

A confusion arises because it is not clear whether *The Family Computer Book* is based on what families can do with computers or a general computer book for all the family.

John Gilbert

The Family Computer Book
Publisher Century Communications
Price £7.95
★★



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Guide to ratings:
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- ★★★★Value for money
- ★★★Nothing special
- ★★Over-priced
- ★A rip-off

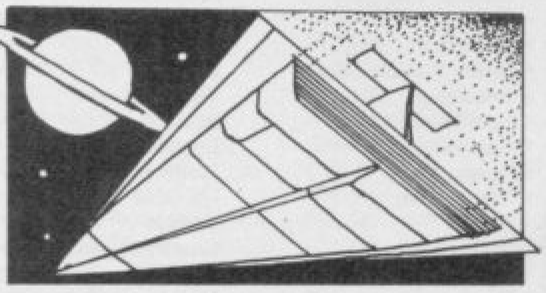
SPECTRUM 16K

Adventure

Planet of Death	Artic	3★

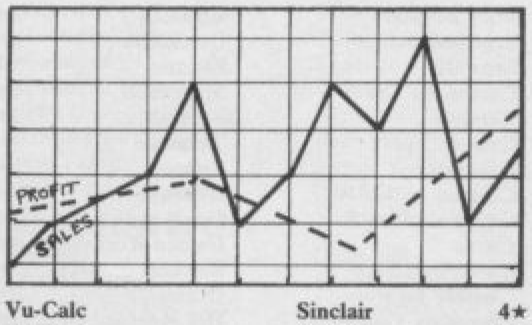
Arcade

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Arcadian	J K Greye	3★
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Blind Alley	Sunshine	4★
Cosmic Guerilla	Crystal	4★
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Business

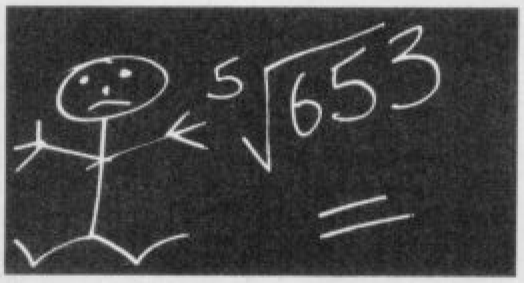
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SPECTRUM 48K

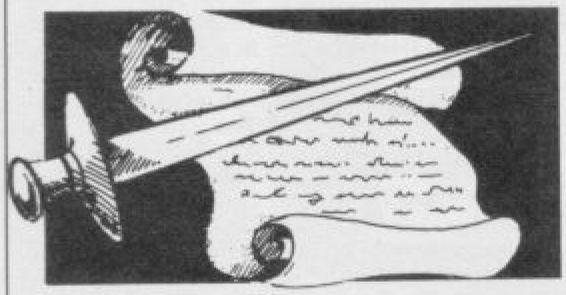
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Quest	Hewson	4★

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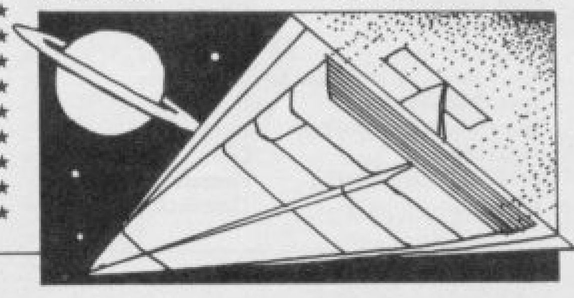
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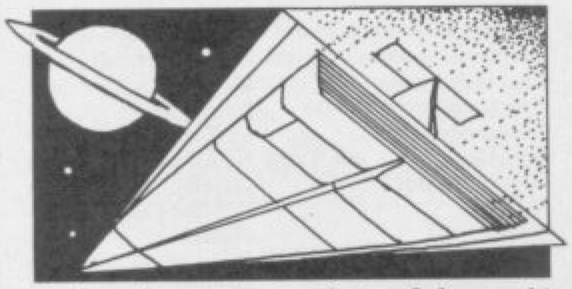
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Armageddon	Silversoft	2★
Astronut	Software Projects	4★
Atic Atac	Ultimate	5★
Automania	Micro-Gen	3★
Avalon	Hewson	5★
Base Invaders	Work Force	3★
Battle Zone	Quicksilva	3★
Bazam	Alan Firminger	3★
Beach Head	US Gold	4★
Bear Bovver	Artic	4★
Birds and Bees	Bug-Byte	4★
Black Hawk	Creative Sparks	4★
Blade Alley	PSS	3★
Blue Max	US Gold	3★
Blue Thunder	Foundry Systems	3★
BMX Trials	Lainlan Software	2★
Booty	Firebird	4★
Boulder Dash	Front Runner	3★
Brian Bloodaxe	The Edge	4★
Brian Jack's Challenge	Martech	2★
Bristles	Statesoft	3★
Bruce Lee	US Gold	4★
Buck Rogers	US Gold	2★
Bugaboo	Quicksilva	4★
Buzz Off	Electric	3★
Caesar the Cat	Mirrorsoft	4★
Carnival	Eclipse	3★
Carpet Capers	Terminal	3★
Cauldron	Palace	5★
Cavelon	Ocean	4★
Centipoid Plus 3	Orwin	3★
Chaos	Games Workshop	4★
Chequered Flag	Sinclair	5★
Chinese Juggler	Ocean	3★
Chocolate Factory	Hill MacGibbon	3★
Chuckie Egg	A & F	5★
Chuckie Egg II	A & F	3★
Chuckman	CCI/Add-on	4★
Close-In	Pulsonic	2★
Codename Mat	Micromega	5★
Confuzion	Incentive	4★
Corridors of Genon	New Generation	5★
Crusoe	Automata	3★
Cyclone	Vortex	4★
Cylu	Firebird	4★
Daley's Decathlon	Ocean	5★
Dangermouse in D. Trouble	Creative Sparks	4★
Death Chess 5000	Artic	4★
Death Star Interceptor	System 3	1★
Defusion	Incentive	3★
Defusion/Worms	K-Tel	2★
Demon Chase	Mansfield	2★
Deus Ex Machina	Automata	5★
Devil Rides In	Mastertronic	4★
Dimension Destructors	Artic	4★
Dodge City	Phoenix	4★
Don't Buy This	Firebird	2★
Dr Franky and the Monster	Virgin	3★
Dragonfire	Cheetahsoft	3★
Dragontorc	Hewson	4★
Driller Tanks	Sinclair	2★
Drive In	Fantasy	2★
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Fantastic Voyage	Quicksilva	4★
Frankenstein 2000	Icon	2★
Frank N Stein	PSS	4★
Fred	Quicksilva	3★
Froot Loop	NTD Software	3★
Galaxy Attack	Sunshine	2★
Ghostbusters	Activision	4★
Ghost Rider	Positive Image	2★
Giant's Revenge	Thor	2★
Gift from the Gods	Ocean	3★
Gilligan's Gold	Ocean	3★
Glass	Quicksilva	4★
Glug Glug	CRL	3★
Go To Hell	666	3★
Havoc	Dynavision	1★
Harry Goes Home	Pulsonic	3★
Helichopper	Firebird	2★
Hellfire	Melbourne House	4★
Herbert's Dummy Run	Mikro-Gen	4★
Hickstead	CCS	2★
High Noon	Work Force	5★
Highway Encounter	Vortex	5★
Hunchback	Ocean	4★
Hunchback II	Ocean	3★
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Icicle Works	Statesoft	2★
Invasion Body Snatch.	Crystal	5★
Jack and the Beanstalk	Thor	3★
Jasper	Micromega	3★
Jet Set Willy	Software Projects	5★
Jet Set Willy II	Software Projects	3★
Jump Challenge	Martech	3★
Killer Knight	Phipps	3★
Knight Lore	Ultimate	5★



Knockout	Alligata	2★
Kokotoni Wilf	Elite	3★
Komplex	Legend	2★
Krakatoa	Abbex	4★
Kung-Fu	Bug-Byte	3★
Laser Zone	Quicksilva	4★
Laserwarp	Mikro-Gen	3★
Lazy Jones	Terminal Software	2★
Les Flics	PSS	3★
Locomotion	Mastertronic	4★
Lode Runner	Software Projects	3★
Loony Zoo	Phipps	3★
Lunar Jetman	Ultimate	5★
Magic Roundabout	CRL	2★
Manic Miner	Bug-Byte	5★
Matrix	Salamander	4★
Maziacs	DK'tronics	4★
Metabolis	Gremlin Graphics	4★
Metagalactic Llamas	Salamander	4★
Mighty Magus	Quicksilva	2★
Minder	DK'tronics	4★
Mission Impossible	Silversoft	3★
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Monkey Biznes	Artic	4★
Moon Cresta	Incentive	3★
Moons of Tantalus	Cornhill	3★
Monty is Innocent	Gremlin Graphics	4★
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Mummy Mummy	Lothlorien	3★
Munnery's Mergatroids	Abacus	3★
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Nonterraqueous	Mastertronics	3★
1994	Visions	2★
911TS	Elite	1★
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On the Run	Design Design	3★
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Paws	Artic	4★
Pedro	Beau Jolly	4★
Penetrator	Melbourne House	5★
Pi-Balled	Automata	4★
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Pitfall II	Activision	3★
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River Rescue	Creative Sparks	2★
Robot Riot	Silversoft	3★
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Spectron	Virgin	3★
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Splat	Incentive	4★
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Starion	Melbourne House	4★
Stop the Express	Sinclair	4★
Strangeloop	Virgin	5★
Submarine Strike	Pulsonic	3★
Super Pipeline II	Taskset	3★



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Tank Trax	Mastertronic	2★
Tapper	US Gold	5★
Technician Ted	Hewson	4★
Terrahawks	CRL	3★
That's the Spirit	The Edge	4★
The Covenant	PSS	2★
The Guardian	PSS	3★
The Pyramid	Fantasy	4★
The Snowman	Quicksilva	4★
Therbo	Arcade Software	2★
3D Bat Attack	Cheetahsoft	3★
3D Lunattack	Hewson	3★
3D Seiddab Attack	Hewson	3★
3D Starstrike	Realtime software	4★
3D Tank Duel	Real Time	3★
3D Tunnel	New Generation	5★
Tiler Tim	Microwish	3★
Time Gate	Quicksilva	4★
Timebomb	CDS	4★
Tobor	Add-on	4★
Tornado Low Level	Vortex	5★
Toy Bizarre	Activision	3★
Trashman	New Generation	5★
Travel with Trashman	New Generation	4★
Traxx	Quicksilva	4★
Tribble Trubble	Software Projects	4★
Trom	DK'tronics	2★
Turtle Timewarp	Softstone	2★
Tutankhamun	Micromania	4★
Two-Gun Turtle	Lothlorien	4★
Underwurlde	Ultimate	5★
Wheelie	Microsphere	4★
Witch's Cauldron	Mikro-Gen	4★
Wizard's Lair	Bubble Bus	4★
Wizard's Warriors	Mastertronik	2★
World Series Baseball	Imagine	3★
Worm Attack	Pulsonic	1★
Worse Things Happen at Sea	Silversoft	4★
Wrath of Magra	Mastervision	4★
Wriggler	Romantic Robot	4★
Xadom	Quicksilva	2★
Xavior	PSS Software	3★
Zenji	Activision	4★
Zig-Zag	DK'tronics	4★
Zombie Zombie	Quicksilva	4★

Business

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Banker	Andic Software	3★
Bank Account System	K Gouldstone	4★
Bizzicom	Merlin	1★
Cash Controller	Shepherd	4★
Collector's Pack	Sinclair	4★
Database	Microl	4★
Decision Maker	Collins	3★
Electric Office	Fisher Software	2★
Entrepreneur	Collins Soft	3★
Heathplanner	Heath Computing	4★
Home Budget	Kuma Computers	3★
Investment, Insurance, Information	Inform	3★
Invoicing/Accounting	Transform	4★
Keyfile	Keysoft	4★
Lifeline	William Stuart	2★
Masterfile	Campbell	5★
Micropen	Contrast	3★
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Profile 2	McGraw-Hill	3★
Projector 1	McGraw-Hill	4★
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Spectext	McGraw Hill	4★
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The Unitrust Program	Michael Slatford	3★
UNISTAT	University Software	3★
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Word Processor	Quicksilva	1★

Education

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Angle Turner	Arnold Wheaton	4★
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Biology	Longman	4★
Blockbuster	Compusound	4★
Bodyworks	Genesis	2★
Castle	L'Ensouleiado	4★
Castle of Dreams	Widgit	4★
Castle Spellerous	Sinclair	4★
Chess Tutor 1	Sinclair	4★
Clown	Englefield Software	2★
Cortes	L'Ensouleiado	3★
Dinosaurs	Piper	3★
Disease Dodgers	Sinclair Research	5★
Dyslexia Beater	Dunitz	4★
Eiffel Tower	Chalksoft	3★
Electronic Learner's Guide	ETST	3★
French	Longman	4★
French is Fun	CDS	3★
Friend or Foe	Longman	3★
Viking Raiders	Firebird	3★
German is Fun	CDS	4★
Highway Code	Learning Systems	3★
Highwire	Englefield Software	2★
Hotline	Chalksoft	3★
Humpty Dumpty	Widget	4★
Inkosi	Chalksoft	3★
Learn to Read 1-5	Sinclair	4★
Light and Heat	Rose Software	4★
Linkword	Silversoft	3★
Look Sharp	Mirrorsoft	4★
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Macman's Magic Mirror	Sinclair Research	4★
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MDA-PCSS	MDA Assoc.	4★
Merchant of Venice	Penguin Study	4★
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Mr T Meets His Match	Ebury Software	3★
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Physics	Scisoft	4★
Pirate	Chalksoft	4★
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Zoo	L'Ensouleiado	3★

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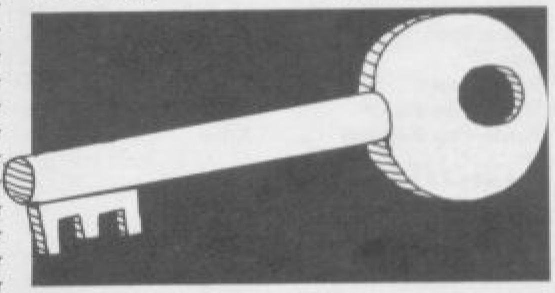
Beta Basic	Betasoft	5★
Forth	Melbourne House	5★
Forth	Sinclair	4★
48/80 Forth	ELR	4★
Hiscft C	Hisoft	5★
Logo	Sinclair	5★
Micro Prolog	Sinclair	4★
Snail Logo	CP	4★
Spec. Forth	Abersoft	5★
Spec. Forth	CP	4★
ZX Forth	Artic	4★

Practical

Astrocalc	Astrocalc	3★
Astronomer	CP Software	4★
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Cricket Averages	Spartan CC	4★
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Diet Master	Diet Master	3★
Dietician	Keysoft	2★
First Aid	Eastmead	2★
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Spacescan	Macmillan	2★
Star Gazer	CRL	4★
Statistics II	Bridge	1★
The Guide to Medicine	Eastmead	2★
Vega-Table	Vega	4★

Puzzle

Arcturus	Visions	3★
Computaword	Work Force	1★
Flix	Softricks	4★
Hareraiser	Haresoft	2★
Mazecube	PAL	3★
Stuart Henry's Pop Quiz	Bellflower	4★
3D Strategy	Quicksilva	4★



Simulation/Strategy

Airline	CCS	4★
Alien	Mind Games	4★
American Football	Mind Games	4★
Angler	Virgin	3★
Arnhem	CCS	5★
Ashes	Pulsonic	4★
Atram	PD Visual Marketing	3★
Barrington's Squash	New Generation	3★
Battle for Midway	PSS	3★
Battle 1917	CCS	4★
Brewery	CCS	4★
Caribbean Trader	East Midland	4★
Combat Lynx	Durrell	4★
Confrontation	Lothlorien	4★
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Fall of Rome	ASP	3★
Fighter Pilot	Digital Integration	5★
Flight Simulation	Sinclair	4★
Football Manager	Addictive Games	4★
Formula One	CRL	5★
Full Throttle	Micromega	4★
Frank Bruno's Boxing	Elite	4★
Galaxy Conflict	Martech	4★
Gangsters	CCS	4★
Gatecrasher	Quicksilva	4★
Golf	Virgin	4★
Grand National	Elite	4★
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Great Britain Ltd	Hessel	4★
Gyron	Firebird	5★
Heathrow Int ATC	Hewson	4★
Howzat	Wyvern	4★
Hunter Killer	Protek	5★
It's Only Rock 'n' Roll	K-Tel	3★
Jack Charlton's Match Fishing	Alligata	3★
Juggernaut	CRL	3★
Match Day	Ocean	3★
Match Point	Sinclair	5★
Millionaire	Incentive	4★

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Mugsy	Melbourne House	4★
New Birkdale	Hornby	4★
New Venture	Falcon	2★
Nick Faldo's Open	Argus	3★
1984	Incentive	4★
Oligopoly	CCS	4★
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Reichswald	MW Gamesworld	2★
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Scatterbrain	Manor	2★
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Stonkers	Beau Jolly	5★
Strike Attack	Micromart	2★
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Super Soccer	Winters	2★
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The Forest	Phipps	4★
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United	CCS	2★
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Viking Raiders	Firebird	3★
War 70	CCS	4★
Whodunnit	CCS	4★
Wilfred the Hairy	Microbyte	1★
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Arcturus	Visions	4★
Backgammon	CP Software	4★
Brag	Turtle	4★
Bridge Master	Serin	4★
Bridge Player	CP Software	4★
Bullseye	Mastertronic	2★
Cluedo	Leisure Genius	3★
Derby Day	CRL	3★
Do Not Pass Go	Work Force	3★
Double Dealer	MFM Software	3★
Draughts	CP Software	4★
Mind Games	Oasis	4★
Monopoly	Leisure Genius	2★
Pontoon	Contrast	2★
Scrabble	Sinclair	5★
Super Bridge	Buffer Micro	4★
Superchess II	CP Software	4★
Superchess III	CP Software	5★
The Turk	OCP	4★
Voice Chess	Artic	5★
Yatzee	CP Software	3★
ZX Draughts	CP Software	4★
ZX Reversi	CP Software	4★

Utility

Allsort S-1	A Firminger	4★
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Assembler	Roybot	2★
Beyond Basic	Sinclair	3★
Building Price	J Redman	3★
Compiler	Softek	3★
Composer	Contrast	1★
FP Compiler	Softek	5★
Games Designer	Quicksilva	4★
HURG	Melbourne House	4★
Keyword Extension	Timedata	4★
Lightmagic	New Generation	4★
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Make Music	Buffer Micro	4★
Melbourne Draw	Melbourne House	4★
Monitor/Diss.	Sinclair	4★
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Quill	Gilsoft	5★
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Softalk 1-2	CP Software	4★
Spec. Compiler	Softek	4★
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Spectrosim	Shiva	2★
Spectrum Extended Basic	CP Software	4★
Spectrum Monitor	Picturesque	4★
Spectrum Sprites	ISP	4★
Spectrum Super Toolkit	Nectarine	4★
Supercode II	CP Software	4★
The Comp. M. Code Tutor	New Generation	4★
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Zeus Assembler	Sinclair	5★

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Adder Assembler	Adder Publishing	4★
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Blackjack	Quest	1★
Cartridge Doctor	Talent	5★
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Super Sprite Generator	Digital Precision	3★
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A & F Software, Unit 8, Canalside Industrial Estate, Woodbine Street East, Rochdale, Lancashire OL16 5LB
Abacus Software, 21 Union Street, Ramsbottom, Nr Bury, Lancashire
Abbex, 20 Ashley Close, Manor Hall Drive, London NW4
Abersoft, 7 Maesfallen, Bow Street, Aberystwyth, Wales
Activision, 15 Harley House, Marylebone Road, London NW1
Adder Publishing Ltd, PO Box 148, Cambridge CB1 2EQ
Add-on Electronics, Units 2,3 & 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ
Addictive Games, 7a Richmond Hill, Bournemouth BH2 6HE
ADS, 8 Bronchurch Street, Portsmouth, Hampshire PO4 8RY
Alan Firminger, 171 Herne Hill, London SE24 9LR
Allanson Computing, 77 Chorley Road, Adlington, Chorley, Lancashire PR6 9LH
Alligata Software, 1 Orange Street, Sheffield S1 4DW
Argus Press Software, Liberty House, 222 Regent Street, London W1
Arcade Software, Technology House, 32 Chislehurst Road, Orpington, Kent BR6 0DG
Ariolasoft,Asphalt House, Suite 105-106, Palace Street, London SW1E
Arnold Wheaton, Parkside Lane, Dewsbury Road, Leeds LS11 5TD
Artic Computing, Main Street, Brandesburton, Driffield YO25 8RG
Astrocalc, 67 Peascroft Road, Hemel Hempstead, Herts HP3 8ER
Atlantis Software, 19 Prebend Street, London N1
Automata UK, PO Box 78, Southsea, Hampshire
Axis, 71 Brookfield Avenue, Loughborough, Leicestershire LE11 3LN
Beau-Jolly, 19A New Broadway, Ealing, London W5
Bellflower Software, 6 Rosewood Avenue, Greenford, Middlesex UB6
Betasoft, 92 Oxford Road, Moseley, Birmingham B13 9SQ
Beyond Software, Lector Court, 151 Farringdon Road, London EC1
Bridge Software, 36 Fernwood, Marple Bridge, Stockport, Cheshire
Bridgemaster, Sandymouth, Beeches Road, Farnham Common, Buckinghamshire SL2 3PS
Bubble Bus Software, 87 High Street, Tonbridge, Kent TN9 1RX
Calpac Computer Software, 108 Hermitage Woods Crescent, St Johns, Woking, Surrey
Campbell Systems, 57 Trap's Hill, Loughton, Essex 1G10 1TD
CCS, 14 Langton Way, Blackheath, London SE3 7TL
CDS Micro Systems, Silver House, Silver Street, Doncaster, South Yorkshire DN1 1HL
Century/Hutchinson, 17-21 Conway Street, London W1
Chalksoft, 17 Willowslea Road, Northwick, Worcester
Cheetahsoft, 24 Ray Street, London EC1R 3DJ
Clever Clogs, Liberty House, 222 Regent Street, London W1
Collins, 18/20 Stephenson Way, North Gower Street, London NW1 2DX
Collins Soft, 8 Grafton Street, London W1
Compusound, 32/33 Langley Close, Redditch, Worcester B98 0ET
Computatutor, 3 Thalia Close, Greenwich, London SE10 9NA
Computer One, 32 Science Park, Milton Road, Cambridge CB4 4DH
Contrast Software, Warren Road, Liss, Hampshire GU33 7DD
Cornhill Software, 2 Penrith Way, Aylesbury, Buckinghamshire HP21
CP Software, 10 Alexandra Road, Harrogate, Yorkshire HG1 5JS
Craig Communications, PO Box 46, Basingstoke, Hampshire
Creative Sparks, Thomson House, 296 Farnborough Road, Farnborough, Hampshire
CRL, 9 King's Yard, Carpenters Road, London E15 2HD
Cross Software, 72 Swanshope, Burney Drive, Loughton, Essex
CSP Systems, 213 Stainbeck Road, Leeds
DACC Ltd, 23 Waverley Road, Hindley, Wigan, Lancashire WN2 3BN
Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY
Delta 4, The Shielding, New Road, Swanmore, Hampshire SO3 9PE
Design Design, 2 Ashton Way, East Herrington, Sunderland SR3 3RS
Digital Integration, Watchmoor Trade Centre, Watchmoor Road, Camberley, Surrey GU15 3AJ
Digital Precision, 91 Manor Road, Higham Hill, London E17
DK'tronics, Unit 6, Shire Hill Ind Est, Saffron Walden, Essex CB11
Domark, 204 Worple Road, London SW20
Dorcas Software, 3 The Oasis, Glenfield, Leicester
Dunitz, 154 Camden High Street, London NW1 0NE
Durrell Software, Castle Lodge, Castle Green, Taunton TA1 4AB
Dymond Software, 22 Hospital Road, Annan, Dumfriesshire DG12
Dynavision Production Studio, PO Box 96, Luton LU3 2JP
East London Robotics, St Nicholas House, The Mount, Guildford, Surrey GU2 5HN
Eastmead, Eastmead House, Lion Way, Camberley, Surrey GU16 5EZ
Eidersoft, The Office, Hall Farm, North Ockenden, Upminster, Essex RM14 3QH
8th Day, 18 Flaxhill, Moreton, Wirral, Merseyside LU6 7UH
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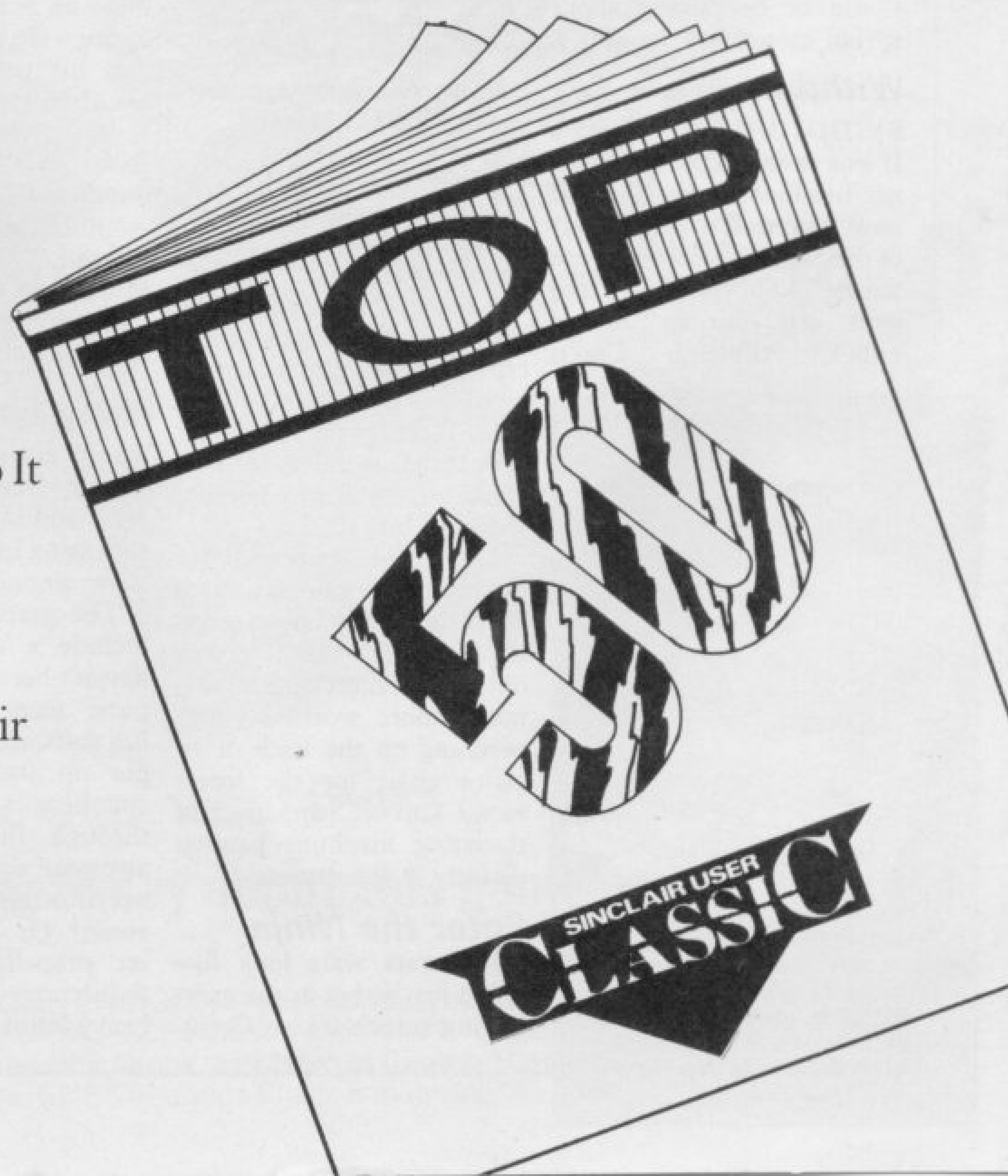
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IS IT....



A. The Cut-out, and Stick Do It Yourself Spectrum 128K.

B. The Sinclair User Guide to Pub Crawling.

C. The Top 50 Book of Sinclair User Classics.

ANSWER: The Sinclair User Guide to Pub Crawling. (Some mistake here surely? Editor).

All that glitters

GREMLIN, voice of the people, telephones **US Gold** to find out why it persists on putting Commode screen shots on Spectrum cassette inserts. Spokesman **Tim Chaney** writhes impressively as he explains that Sega and other yank coin-op game merchants despise the Spectrum.

"Being Americans, they don't see why the game should go out with inferior screen shots to those which they can produce from the original coin-op or Commodore versions" he says.

Tim assures readers that US gold is not trying to con anybody — it clearly states where Commodore screen shots have been used. Anyway, many of the games, like **Dambusters**, look just as good on the Spectrum as on the Commodore.

That being the case, why pander to American prejudice? Tim mutters something about duplication of photography and printing. Could he be talking about saving money?

Withdrawal symptoms

If you were expecting banner headlines from Gremlin now **Maxwell's** pulled out of the **Sinclair** deal you were wrong. You wouldn't have seen any in the *Mirror* either. Although **Cap'n Bob's** rag blazed away with 'Maxwell Saves Sinclair' at the time, the news that he went back on the deal only rated a few paragraphs on an inside page.

Staff at Sinclair Research may be relieved at the thought that Bob won't be calling in their chequebooks for all expense accounts after all . . .



DAVID WHITE of Saga demonstrates his new bio-degradable keyboard. In conjuction with Tasword II, it allows you to do word-processing in the alimentary canal, thus ensuring a highly personalised end copy.

Altered states

Meanwhile **Sir Clive** maintains a bold front of bullish optimism about Maxwell breaking off their engagement. No weeping virgin he. "Twenty-six thousand people in the US want to buy QLs," is one of the lines he's pushing.

Gremlin reckons it begs the question. If the yanks are so keen on the machine, why does Slugger keep postponing the US launch? . . .

Weight of authority

While we're on the subject of QLs, *Sinclair User* has been moving in exalted circles recently. You may have spotted that maestro of the critical insult, **Chris** 'lunch-breaks' **Bourne** holding forth recently on *Newsnight* about the wonders of the black beast and why nobody wants to buy it.

Our Chris, whose ability to bore entire saloon bars to death is legend, droned on happily until the film ran out. Gremlin reckons he was much more worried about perching on the back of an office chair for the interview. This had the effect of thrusting his huge paunch directly at the camera . . .

Enter the Ninja

The karate wars look like being just as hot as the great boxing punch-up — Gremlin, passim. **Melbourne House** is already riding high with **Way of the Pretentious Fist**, while **System 3** has yet to bring out **International Karate.** It seems ninjas broke in and pinched a whole load of gear, including some of the core routines. Hence the delayed launch.

Meanwhile, **Andy** 'Cartier' **Shafte**, the cool elegant production manager at System 3, wants to know why the magazine doesn't mention him as a major industry figure. He has some idea that his great talent helps entertain people — "which is what your magazine is about, so in effect I pay your wages."

"Andy needs his wrists slapped," says his boss, **Mark Cale**. "I'm more of an industry figure than he is, and I'm nobody . . ."

Reely heavy, man

Those ageing comics, **The Young Ones** — Rik, Viv, Neil and Mike — will be appearing in the game of the show around November.

The graphics are said to include 'a few things which haven't been tried on a computer game before'. What has software house **Orpheus** got up its sleeve? Vivian smashing cricket bats through the screen? The awesome sight of Neil's snot overflowing into your living-room? Or SPG the hamster propelled by his own flatulence after a really heavy lentil curry . . .?



PRACTICAL Uses for the C5 No. 73: Paul 'porn-king' Raymond finds that the C5 can be an excuse for publishing tacky pictures in dirty magazines. But which *SU* stalwart discovered the pic? Answer on a postcard please . . .

Top secret

Slugger's been denying the existence of the **Spectrum 128K** for so long now that everybody must know it's on the way. Some machines have even been sent out to software houses, it seems, with letters about how secret it all is and how the computer must be carefully guarded.

So which software house is so blasé about its model that it's been left lying around the office for any old industrial spy to see . . .?

Cat splat

Brazen Backslappers of the Month Award goes to **Artic** for their sicko press release about a cat named **Selwyn**. Artic claims Selwyn was the beloved pet which inspired the game **Paws**. Gremlin thought the game was inspired by the idea of acquiring the rights to the musical *Cats*, but let it pass.

Sadly, Selwyn is dead, 'struck down in his prime while crossing the road'. What a great excuse for sending everybody a reminder of Selwyn's alleged game. Gremlin hopes Artic will now have the decency to send all profits accruing from the game to the RSPCA . . .

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After reviews like that, what more can we say?

"I think the best thing to say about this game is BUY IT!"

ZZAP! 64

Frederick Forsyth's THE FOURTH PROTOCOL — THE GAME is available on cassette for the Spectrum and CBM64 at £12.95 and on disk for the CBM64 at £15.95. Published by Century Communications, a division of Century Hutchinson Ltd. Brookmount House, 62-65 Chandos Place, London WC2N 4NW



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